THE

FISHES OF INDIA;

BEING

A NATURAL HISTORY

OF

THE FISHES

KNOWN TO INHABIT THE SEAS AND FRESH WATERS

OF

INDIA, BURMA, AND CEYLON.

BY

FRANCIS DAY, F.L.S., & F.Z.S.,

MEMBER ASIATIC SOCIETY OF CALCUTTA AND COTSWOLD NATURALISTS' FIELD CLUB, ETC.,
LATE SURGEON-MAJOR MADRAS ARMY, AND INSPECTOR-GENERAL OF FISHERIES IN INDIA AND BURMA.

VOLUME I.
TEXT.

LONDON:

PUBLISHED BY BERNARD QUARITCH, 15 PICCADILLY.

1878.

Day's Fishes of India

Dates

Text and Atlas 1878

Supplement, pp. 779—816, published 1888.

Supplement without plates.

Actual dates pt. 1 p. 1-168. 1875

pt. 2 p. 169-368. 1876

pt. 3 p. 369-552. 1877

pt. 4, p. 553-778. 1878

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PREFACE.

The work I now present to the notice of the reader is, I believe, the only attempt which has yet been made to publish a fairly complete account of the Ichthyology of our Indian Empire. I propose, therefore, to preface it by a short sketch of the circumstances which have led to its being undertaken, as likewise by some notice of those zoologists who have preceded me in endeavouring to advance the knowledge of this branch of Natural History in the East; and I have added comments on such matters connected therewith as seem to be of interest to the scientific public, or relate to the economic value of the Fisheries. It is now many years since I commenced to devote time and no small labour to these subjects. From 1859 to 1862 I was on duty at Cochin, and spent most of my spare hours in collecting specimens of the fish along that coast. The examples secured and preserved were numerous, and the results are embodied in a work, "The Fishes of Malabar," which may perhaps be considered the germ from which the present and more pretentious treatise has taken its origin.

The notice of Government was drawn to the subject in the following manner. In 1867 Her Majesty's Secretary of State for India, in a despatch to the Madras Government, directed their attention to a letter from *Sir Arthur Cotton*, in which he said he "should suppose that the injury to the coast fisheries must be very great, now that seven of the principal rivers on the East coast" are barred by irrigation works that had been constructed. In consequence of this I was directed by the Government to visit the "anicuts" or weirs in the Madras Presidency, in order that the Heads of Departments might have fuller information on the subject than had been offered them up to that date. This order was carried out as follows:—first the districts to the south of Madras were inspected, and then those to the north. I was afterwards instructed to continue these inquiries, and went to Orissa and Lower Bengal, afterwards to British Burma, and at the end of 1869 to the Andaman Islands. An accident which occurred during these investigations compelled me to proceed to Europe in March, 1870, but this enabled me to visit many of the fish-ladders in use in England, and I returned at the end of the year to India.

My visits to the irrigation works on the rivers of Southern India in 1867, had, however, completely established the fact that the fish which, prior to the erection of the weirs, had ascended the rivers during the season of the rains for the purpose of spawning, were not only prevented from proceeding up stream to spots suitable for the deposition of their ova, but were collected in such vast numbers immediately below these weirs, which they vainly attempted to pass, that the wholesale manner in which they were caught by the native fishermen almost amounted to extermination of the spawning fish of each season. The want of legislation

on the subject was fully recognized, but it was also seen that our knowledge of the Ichthyology of that part of the world was exceedingly imperfect. Under these circumstances I was offered the post of Inspector-General of Fisheries, with power, when not required to be present at the seat of Government, to travel about the country and collect information on subjects connected with the Department.

My time was spent in these pursuits from January, 1871, to early in 1874, during which period I visited every large river in India, and nearly the entire coast from Gwadur in Beloochistan to Mergui in Tenasserim. This enabled me to form a private collection of many thousand specimens taken from various parts of India, and, I believe, fairly representing the Ichthyology of the lakes and rivers and of the Indian Ocean. The present work contains descriptions of 1340 species, 1185 of which are in my own collection: I have also personally examined 111 additional Indian species in other Museums, some of which I have figured: the remaining 44 forms are described from the writings of others, as I have not yet seen examples of them. It is from these materials that I have endeavoured to meet the wishes of Government that I should prepare a work on "The Fishes of India."*

It must not, however, be supposed from what I have just stated, that I have any wish to ignore the merits of those Ichthyologists who have preceded me in the treatment of this subject. Science is deeply indebted to those gentlemen, most of whom I will endeavour to specify by name and to add a few words respecting the labours of each.

The first writer on Indian Fishes I propose adverting to is *Bloch*, whose splendid work on "Auslandische Fische" was published in 1785. It, his "Ichthyologie," and the continuation of this latter by *Schneider* in 1801, contain many Indian marine forms. To these must be added *Lacépède's* "Histoire des Poissons," 1798-1803. No small impetus was given to the practice of fish-collecting in India by the publication of these treatises, which fully deserve to receive a large share of praise and respect.

Dr. Russell, Naturalist to the Madras Government, was the author of the "Fishes of Vizagapatam," wherein 200 forms are delineated and described. The work was published in two volumes folio by the Court of Directors of the Hon. East India Company in 1803.

Dr. Francis Buchanan† (who subsequently took the name of Hamilton) was born at Branziet, in Stirlingshire, February 15th, 1762. Having completed his education and obtained his diploma at Glasgow, he subsequently studied at Edinburgh, receiving his degree in 1783. He entered the Navy, but had to leave on account of ill-health. In 1794 he was appointed an Assistant Surgeon in the Hon. East India Company's service on the Bengal establishment, and soon after his arrival in Calcutta he was sent with Capt. Symes on his mission to Ava, and employed his leisure in collecting specimens of Natural History, not only in Burma but subsequently at the Andaman Islands. He forwarded his collections and drawings to the Hon. Court of Directors, who presented them to Sir Joseph Banks. Returning to India he was stationed for two years at Luckipoor, near the mouth of the Brahmaputra, when the fishes of that locality attracted his attention. In 1798 he was sent to examine the district of Chittagong, and the country in the vicinity: here he largely augmented his botanical collections, which

* The parts of this work have been published as follows:—Part I, August 1875, to end of page 168, with 40 plates and 130 figures: Part II, August 1876, to end of page 368, with 41 plates and 148 figures: Part III, August 1877, to end of page 552, with 55 plates and 305 figures, while Part IV contains 61 plates with 343 figures. The number of plates are 198, the last being CXCV, but li *a*, li *b*, li *c*, are also inserted. The figures in 42 plates were personally delineated. The Government copies, and those only, have "End of Vol. I" printed at p. 320, and contain a separate Index for that portion.

† Chambers's "Lives of Scotchmen," i, p. 393.

were disposed of as his Burmese ones had previously been. Part of 1799 was employed in investigating the Fishes of the Ganges and its branches. In 1800 he was commissioned to report upon the state of Malabar, lately conquered from Tippoo Sultan, when he found three new species of carps. In 1802 he was sent with Capt. Knox to Nepal, of which he published a history in 1818, but he restricted his Natural History investigations to botanical pursuits. In 1806 he was directed to make a comprehensive statistical survey of the territories comprising the Presidency of Bengal as well as of some adjacent districts. This occupied seven years, and it is only those who have had the opportunity of inspecting the vast amount of information his twenty-eight thick folio volumes of MSS. contain, that can appreciate the enormous amount of labour undergone, as well as the extreme accuracy of detail which is there displayed. In 1815 he returned to Europe, but the drawings of fish, &c., he was not permitted to take with him; and subsequently he appears to have been refused access to his original MS. report, when he desired to publish, at his own cost, the "Fishes of the Ganges," which he did in 1822 in one vol. quarto. It contains descriptions of 269 species, and is illustrated by 97 figures. There is no record of his having brought any specimens to Europe.*

Cuvier and *Valenciennes'* "Histoire Naturelle des Poissons" (commenced in 1828, and the last of the volumes of which was published in 1849) has perhaps done more than any other Ichthyological work in the present century to stimulate a liking for Ichthyology.

Mr. J. Bennett, of the Ceylon Civil Service, published in 1830 a beautifully illustrated work containing coloured figures of 30 of the most beautiful and interesting of the Fishes found on the coast of Ceylon. This was intended as the first instalment of a large work on the subject, which, however, was never completed.

Dr. Cantor, of the Bengal Medical Service, was the next Indian author who wrote upon Fish, in a paper in the "Journal of the Royal Asiatic Society," 1839, entitled "Notes respecting some Indian Fishes," being observations he had made while discharging the duties of Surgeon to the Hon. Company's Marine Survey. Subsequently, in 1850, his "Catalogue of Malayan Fishes" was published in the "Journal of the Asiatic Society of Bengal." It contains full and accurate descriptions of 292 species, to which are added 14 plates of fish or anatomical details. His collections became the property of the Hon. East India Company, and were transferred to the British Museum† in 1860.

Dr. John McClelland, of the same service, having been attached to a mission sent to Upper Assam in the winter of 1835-36, devoted the time spent on the river to the examination and figuring of species of fish,‡ and in 1839 published a memoir on "Indian Cyprinidæ" in the second part of the 19th volume

* See remarks under the head of *Blyth*, p. v.

† The Museum at the India House received in 1819 from *Dr. Horsfield* some fishes from Java; in 1823, a collection containing fish sent by *Dr. Finlayson*, Surgeon and Naturalist to Crawfurd's Mission to Siam and Hué, the capital of Cochin China. *Dr. Griffith's* zoological collections made in Afghanistan, and containing fish, were sent to the same Museum by the Bengal Government in 1842, and the following year he personally presented more. The Asiatic Society of Bengal at several times also sent fishes to the India Museum, and so did the Bombay Government in 1851. *Mr. Brian Hodson*, of the Bengal Civil Service, likewise presented some Nepal and Calcutta fish to the British Museum.

‡ *General Hardwicke's* "Illustrations of Indian Zoology," edited by *Dr. Gray*, were published in 1830-35. A majority of the Indian fishes are copies from Ham.-Buch. original figures, of which *McClelland* observes "although they seem to have been withheld from Buchanan himself, the following drawings from his original collection of unpublished figures of fishes have found their way from the Botanic Gardens (in Calcutta) into Hardwicke's Illustrations without any acknowledgment to point out from whence they were derived." A list of some of these figures follows. "Years have elapsed," says *Cantor* in 1850, "and no explanation has been offered to Mr. McClelland's just observations." The late Dr. J. E. Gray observed (in a letter to myself, dated January 19th, 1872), "Hamilton and Hardwicke were great friends, and he allowed his artist to make copies of all his fishes from Mysore and other drawings for General Hardwicke, in whose collection of drawings now in the Museum they are to be seen. Mrs. Gray engraved a large number of the small unfigured species from that series but they have not been published." I may add that I obtained a set of these figures along with some of the late Dr. Jerdon's MSS.; there are six 4to. plates containing 46 figures.

of the "Asiatic Researches" (pp. 217-465), with 25 plates, having 103 full figures of fish besides details, 39 as stated by McClelland are copies from Ham.-Buch. drawings. The number of species described is 138. He observes, "I am indebted to the gracious consideration of the RIGHT HONORABLE, GEORGE, LORD AUCKLAND, G.C.B., &c., not only for the opportunity of examining my collection of fishes, which had otherwise been denied on my return from Assam, but also for the inspection of the splendid collection of drawings of the late *Dr. Francis Buchanan-Hamilton*, which," he continued, "contained 144 coloured figures of fish: amongst mammals, 5 of *Simia*, 5 of *Felinæ*, 6 *Cervidæ*; of birds about 60 of *Falconidæ*, 150 *Insessores* and 74 *Grallæ*, the whole amounting to about 900 drawings." Subsequently (1841) Dr. McClelland commenced the "Calcutta Journal of Natural History," which extended to six volumes, and in the pages of which are several papers upon the Fishes of India, more especially on the collections made by *Dr. Griffith*. Many of the specimens were transmitted to the Museum at the India House,* from whence they were transferred to the British Museum in 1859.

W. H. Sykes entered the Bombay Army in 1804, when in his fifteenth year. In 1824 he was engaged by Government to assist in a statistical inquiry, and was thus employed until 1831, when he quitted India as a Lieutenant-Colonel. He made a report that same year to the Court of Directors of the East India Company upon the "Fishes of the Dukhun," accompanied by some good drawings and also specimens. These were left unnoticed until 1838, when they were, at the author's request, transferred to the "Zoological Society of London," who published them in their Transactions, vol. ii, 1841, pp. 340-378. They contain descriptions of 46 species and give 28 figures. Some of the fishes, without any labels, were transferred to the British Museum in 1860 from the India Office. Other specimens, perhaps skins, were wanting; they may have been presented elsewhere or retained by the author.

Dr. Wyllie entered the Madras Medical Service on June 11th, 1812. He contributed a paper on the accessory breathing apparatus of *Silurus singio* to the "Proceedings of the Zoological Society of London" in 1840, p. 34. He sent to Europe some stuffed fish, now in the British Museum.

Dr. Pieter v. Bleeker was born at Zaandam, in Holland, July 10th, 1819. He was apprenticed to an apothecary from 1834 to 1837, in which latter year he commenced his studies at Haarlem, where he graduated in 1840 and received his diploma. At the end of 1840 and the commencement of 1841 he spent six months at the Paris Medical School, and when in that city appears to have acquired a taste for Ichthyological pursuits. May 24th, 1841, he obtained entrance by public competition into the Army Medical Department, embarking for Batavia in November, and arriving there March 13th, 1842. He returned to Europe in 1860, and was placed on the pension establishment, April 1st, 1864. He collected in the East and brought in safety to Europe large zoological collections, that of fishes alone exceeding 30,000 examples. His papers upon the Fishes of the East are too numerous for me to give the titles. In 1853 he published a paper on the "Ichthyologische fauna van Bengalen," pp. 162, with lists of all the fishes previously described from India, and detailed descriptions of 162 species. In 1862 he gave descriptions of 11 species of carps from Ceylon, which had been sent to the Leyden Museum: his paper has 4 plates illustrated with 11 coloured figures. His magnificent "Atlas Ichthyologique des Indes Orientales Neerlandaises" must ever remain as a lasting testimony to his unwearied industry, scientific acquirements, and accurate determination of species. Unfortunately his sudden death, on January 24th, 1878, occurred when he had only completed eight out of the twelve volumes; and though much of the remainder is left in a forward state, it is to be feared that circumstances may prevent its publication being completed.

* List in "Cal. Journ. Nat. Hist." ii. p. 573.

Mr. Blyth, the able Curator of the Museum of the Asiatic Society of Bengal, gave several interesting articles in their Proceedings on the Fishes of India: in 1858, remarks on some Fishes from the Andamans, pp. 270-272; Fishes from Pegu, Calcutta, and elsewhere, pp. 281-290; Fishes of Pegu, 1859, p. 297; The Cartilaginous Fishes of Lower Bengal, 1860, pp. 35-45; On some Fishes from Port Blair, 1860, p. 111; On some Fishes of the Tenasserim Provinces and Lower Bengal, 1860, pp. 138-174. He sent a number of fishes, personally collected, to Europe, and he informed me that he entertained no doubt but that in the "collection of Fishes from Bengal, believed to contain many typical specimens of Buchanan-Hamilton's work, presented by G. R. Waterhouse, Esq." to the British Museum,* were some which had been sent by him to England. Having been permitted by Mr. Winter Jones to examine the register, I find the majority of the generic names under which they were received as *Ailia, Ambassis, Amblyopus, Apocryptes*, &c., were not invented until after Buchanan's death.

Col. Tickell, of the Bengal Army, gave a paper on *Asthenurus atripinnis* to the "Journ. Asi. Soc. of Bengal," 1865, p. 32, pl. i. He also sent large collections of fish to the Calcutta Museum, and has left a MS. volume of beautiful drawings of fish with descriptions.

Dr. Thomas Caverhill Jerdon, so well known as the author of the standard work on "The Birds of India," 3 vols., and another on "The Mammals," 1 vol., devoted some time to Fishes. The first part of his "Fishes of Southern India" was published in the "Madras Journal of Literature and Science," vol. xv, 1849, p. 139 to 149, and contained descriptions of 22 species, 3 of which were stated to be new. The second part was also in the same volume (p. 302 to 346); it contained descriptions or references to 150 species, 55 of which were believed to be new. In 1851 he gave another paper to the same journal, entitled "Ichthyological Gleanings in Madras," p. 128 to 151, it contained references to 391 species obtained during a two years' residence in Madras. A considerable number at that time were unknown to science, but he refrained from naming them, which has been subsequently done by others. He had coloured figures made of large numbers, and presented some fine stuffed specimens to the British Museum.

Dr. Günther, of the British Museum, has considerably facilitated the study of fish by compiling a "Catalogue of the Fishes in the Collection of the British Museum," eight volumes 8vo. 1859 to 1870, published by order of the Trustees. The work is said to contain 6843 well established and 1682 doubtful species. The "Fishes of Zanzibar," published by the same author in conjunction with *Col. Playfair*, must also be alluded to, as it supplies a list of 500 fishes found along the East coast of Africa. It contains 22 plates and 67 figures of fish, some of which are simple outlines. The specimens, mostly dried skins, are in the British Museum.

Dr. Klunzinger has given two excellent papers upon the Fishes of the Red Sea in "Verhandlungen der k.k. zool-bot. Gesellschaft in Wien," 1870, pp. 669-834, and 1871, pp. 441-688. Some of his specimens are in the British Museum.

It is my pleasing duty to offer my best thanks to the many friends who have afforded me assistance in order that I might complete this work in a satisfactory manner, and amongst my official superiors more especially to *General R. Strachey*, F.R.S., and *A. O. Hume, Esq.*, C.B. Amongst those who have given me help in the East, or furnished me with materials they have collected there, I must especially mention *Sir Walter Elliot*, K.C.S.I., formerly of the Madras Civil Service, who most liberally placed at my disposal the whole of his beautiful and accurate coloured illustrations of the Fishes of Madras and Waltair which he had had executed by native artists from the fresh specimens. These comprise many hundred species, each with its native name attached, as well as Jerdon's identifications, thus giving me the key to the fishes recorded in "Ichthyological Gleanings in Madras" (M. J. L. and S., 1851).

* British Museum Catalogue, iii, 1861, p. iv.

Besides this he has obtained for me a few of Jerdon's original type specimens, some of which I have had figured, also a good number of MS. notes, as well as Cantor's MS. opinions upon the sharks and rays. It will be seen in the pages of my work that I have quoted largely most interesting details from some of these; and I hope before long to complete a coloured series of the Fishes of India, which I could hardly accomplish in a satisfactory manner were it not for Sir W. Elliot's assistance.

Henry Sullivan Thomas, Esq.,* Madras Civil Service, the author of a most able and exhaustive report on "Pisciculture in South Canara,"† has given me very great assistance, not only in collecting large numbers of beautiful specimens from the fresh waters of Canara as well as from the sea, but also in ascertaining a great deal respecting the habits of fish, their breeding, and what a lamentable necessity exists for legislation with respect to the finny tribes. He has had a few excellent coloured figures of some fresh-water fishes executed for me by native artists, and also sent me a collection of the Fishes of the Shevaroys, some from Madras, and the first example of a trout bred in India in a wild state.

The late *Dr. Ferdinand Stoliczka*,‡ the able and energetic Natural History Secretary of the Asiatic Society of Bengal, assisted me both while collecting and also in obtaining specimens from localities I did not visit. His first large collection of fish was made at Penang, and on his return voyage by the Nicobars and Andamans: in the cold season of 1871 he obtained 18 species while on a tour through Cutch ("Journ. Asi. Soc. of Beng.," 1872, pp. 258-260): in 1873 he went as Naturalist with the expedition to Yarkand; the collection of fish which he then made comprised 22 species, out of which 9 were new ("Proc. Zool. Soc. of London," 1876, pp. 781-807).

I have likewise to offer my thanks to *Dr. J. Anderson*, of the Imperial Museum at Calcutta, for affording me every facility towards examining its most interesting Ichthyological collection, as well as for obtaining and transmitting to me in this country some species I wished to dissect; also to *Mr. J. Wood-Mason*, of the same institution, who assisted me in my collections. *Dr. Duka* and *Dr. Govan* kindly collected for me at Almorah and Darjeeling, *Dr. Wright* in Nepal, *Major Puckle*§ in Mysore, *H. E. Watson, Esq.* in Sind, and *Col. Sladen* at Mandalay in Upper Burma, while *Capt. Neill* and *Dr. Caldecott*, of the 1st Central India Horse, sent me a small collection of fishes from Agur. *Dr. Bidie* gave me leave to freely examine the specimens in the Government Central Museum at Madras, and likewise had a collection made for me during my absence. *Dr. Keess*, the Garrison Surgeon, kindly superintended the work of a native collector. Irrespective of those enumerated there are many others who have assisted me with specimens or in various other ways, to each and all of whom I beg to tender my acknowledgments.

In Europe I have more especially to thank *Professor Peters*, Director of the Berlin Museum, who not only most freely gave me access to the valuable contents of the magnificent collection of fishes under his charge, but has also aided me in my difficulties and assisted me with regard to Bloch's type specimens.

* Author of "*The Rod in India*," or hints how to obtain sport, with remarks on the Natural History of Fish, Otters, &c., 8vo., Mangalore, 1873, pp. 319. An excellent work for the use of the angler in India.

† Printed by order of the Secretary of State for India, 1870, pp. 77.

‡ *Dr. Stoliczka* was born in Moravia in 1838. His earlier professional career was passed in the Imperial Geological Institute of Austria, where he became greatly distinguished by his palæontological work. In 1862 he accepted the appointment of Palæontologist to the Geological Survey of India. He was selected as Naturalist to accompany the Yarkand Mission. In accepting this post he was made fully aware of the risk he was running, his health never having been completely restored after an expedition he had undertaken some years previously to the higher regions of the Himalayas. On the return of the Mission from Yarkand he perished, due to the extreme cold at the summit of the Karakorun Pass, June 19th, 1874.

§ Author of a paper entitled "Fresh-water Fish, in and about Bangalore," folio, 1868, pp. 12.

Among the Officials at the British Museum, I must record my acknowledgments to *Professor Owen*, C.B., *Mr. Winter Jones*, and the late *Dr. J. E. Gray*, for such help as they were able to afford me to obtain free access to the Ichthyological collection.

At the Hague, the late *Dr. Bleeker*, not only permitted me free access to his invaluable Ichthyological Museum (containing about 2000 species),* his notes and his unpublished figures of fish, but he also assisted me with his opinion on the validity of species as well as presented me with many of his types. In him I have personally to deplore the loss of a kind friend, and one who stood unrivalled among the Ichthyologists of the present time.

Professor Schlegel, the Director of the Leyden Museum, and his able Ichthyological assistant, *Dr. Hubrecht*, have rendered me invaluable assistance. The latter, as may be seen in the pages of this work, has been indefatigable in searching out superior examples of such fish as I desired to figure, but of which I did not possess sufficiently good specimens.

At Paris, I have to offer my thanks both to *M. Vaillant* and *Dr. Sauvage*, who most kindly assisted me at the Museum in the Jardin des Plantes, more especially in respect to the type specimens of Cuvier and Valenciennes' great work on Fishes. I cannot resist noticing here how excellently preserved and scientifically registered the fish in that unrivalled Ichthyological Collection are.

I have also to give my best thanks to *A. C. Brisbane Neill, Esq.*, of the Madras Medical Service (retired), for his valuable assistance in carrying this work through the press, a labour which can scarcely be appreciated except by those who have undertaken similarly arduous tasks.

The following are a list of papers published by myself, all more or less connected with Indian Fishes:—

On the Fishes of Cochin, Pt. I. *Acanthopterygii*, Proc. Zool. Soc. 1865, pp. 1—40.
,, ,, ,, Pt. II. *Anacanthini, &c.* ,, ,, pp. 286—318.
On the Fishes of the Neilgherry hills and rivers around their bases, Proc. Zool. Soc. 1867, pp. 281—302.
On some Fishes from the Wynaad, Proc. Zool. Soc. 1867, pp. 347—350.
On some new or imperfectly known Fishes of Madras, P. Z. S. 1867, pp. 558—565.
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,, ,, ,, ,, *India*, P. Z. S. 1867, pp. 699—707.
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On some new Fishes of Madras, P. Z. S. 1868, pp. 192—199.
On a new Gobioid Fish from Madras, P. Z. S. 1868, pp. 272—273.
Pisciculture on the Neilgherry hills, Madras Quar. J. Med. Sc. 1868, pp. 37—99.
Catalogue of Indian Fresh-water Fishes (Acanthopterygii), M. Q. J. M. Sc. 1868, pp. 1—73.
Observations on Indian Fresh-water Fishes (Respiration), P. Z. S. 1868, pp. 274—288.
Observations on some Indian Fishes, P. Z. S. 1868, pp. 580—585.
On the Fishes of Orissa, P. Z. S. 1869, pp. 296—310.
On the Fishes of Orissa, Pt. II. P. Z. S. 1869, pp. 369—387.
Catalogue of Indian Fresh-water Fishes (Cyprinodontidæ), Madr. Quar. J. L. and Sc. 1869, pp. 328—333.
Remarks on Fishes in the Calcutta Museum, P. Z. S. 1869, pp. 511—527.
,, ,, ,, ,, ,, ,, pp. 548—560.
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On the Fresh-water Fishes of Burma, P. Z. S., 1869, pp. 614—623.
,, ,, ,, ,, ,, 1870, pp. 99—101.

* His collection, at the time of his death, including European forms and those received in exchange, numbered 2348 species of Fish: 152 of Reptiles and Amphibia, and 12 Cephalopods.

Observations on the Andamanese, Proc. A. S. of Beng. 1870. pp. 153—177.
Notes on Fishes of the Nicobars, Journ. As. S. of Beng. 1870, pp. 34—35.
Notes on the Genus Hara of Blyth, J. A. S. of Beng. 1870, pp. 37—40.
Notes on some Fishes from the Western coast of India, P. Z. S. 1870, pp. 369—374.
On Turtle and Fish Oils, Madr. Monthly J. Med. Sc. April, 1870, pp. 294—301.
On the Fishes of the Andaman Islands, P. Z. S. 1870, pp. 677—705.
Monograph of Indian Cyprinidæ, Pt. I. Journ. As. Soc. of Beng. 1871, pp. 95—143.
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On some new or imperfectly known Fishes of India and Burma, P. Z. S. 1873, pp. 107—112.
,, ,, ,, ,, ,, P. Z. S. 1873, pp. 236—240.
On some new or little known Fishes of India, P. Z. S. 1873, pp. 704—710.
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Cheltenham, December 1st, 1878.

INTRODUCTION.

Prior to commencing an account of the fishes existing in India and Burma, it will be necessary to define the *Geographical limits* of the countries or seas the Ichthyology of which I propose to describe. They may be briefly summed up as the regions of Sind, India, Ceylon, Assam and British Burma extending eastwards to Mergui in the Tenasserim Provinces, and including the Nicobar and Andaman Islands in the Indian Ocean. The boundaries are the Beloochistan and Sulieman ranges of mountains on the West and North-West, the Himalayas and Upper Burma on the North and North-East, and the Indian Ocean to the South. Within the foregoing area we find, as might be anticipated, vast differences of climate as well as of locality.

The *rivers* vary in their conditions owing to the season of the year, the rainfall, and other circumstances, both natural and artificial. Some rivers, as those which descend from the Himalayas, possess *Alpine sources*, and in the hot months of the year are chiefly fed by the melting of ice and snow, while in the monsoon season they are filled by the rains. Thus in the commencement of March, floods begin in the Indus, when inundations are more due to melting snows than to the fall of rain; on the contrary, in the upper regions of the Ganges and Jumna, the rainfall is very considerable, occasioning floods, which subside as rapidly as they rise. During the cold season these rivers being unreplenished by rains or melted snows, are at their lowest.

In *rivers destitute of Alpine sources,* as the Nerbudda, Kistna, Godavery, and those arising on the Western ghauts or lower hill ranges, snow rarely falls and never remains for any length of time. Along with these must be classed as being of the same character, the affluents of the larger snow-fed rivers, and it is in such where the temperature of the water is higher, that most of the hill fishes (excepting some loaches and perhaps the *Schizothoracinæ*) breed. If we take as an example the rivers on the Malabar coast, which as a rule have their origin in the Western ghauts, we perceive that they receive the full force of the South-West monsoon, which commencing in June, continues about three months. It is only at this period of sudden rises and falls of the river, that breeding fish can ascend to the hill ranges for the purpose of depositing their ova in suitable localities. As the monsoon ceases, the waters subside, and the breeding fish descend to the plains, leaving the young to be reared in the pools remaining in the hill streams.

The *rivers of the plains* may be divided into those which have always a fair supply of water, as the Indus, Ganges, Brahmaputra and Irrawaddi: and others which are comparatively dry during part of the year. In some of these latter this deficiency of water is increased by what remains being abstracted for irrigation purposes.

During the *rainy months* of the year rivers are usually at their highest, submerging the contiguous country, and filling the numerous tanks: here many fish retire to breed and are entrapped by every device the ingenuity of man can conceive.

Weirs or bunds, as I have observed, affect fisheries by preventing the ascent of breeding fish to their spawning grounds. Irrespective of this, any descending a river and arriving at a weir, find an obstruction to their further progress down stream, but a large quantity of water being deflected from its natural course down an irrigation canal, they as a consequence descend by this the only open route. Once down a canal and over a single fall, there is no possibility of their return, and as these canals are being constantly dried in order that the engineers may examine their structure, they become vast traps for the destruction of the finny tribes, as successive waves of living fish pass down them only to die.

We find the same process going on elsewhere, although to a less extent. Thus in Malabar as the dry season commences, water is required to irrigate the second rice crop; but the rivers are very low, so the farmers collect stones, lay them across the stream, filling in the interstices with shingle and stopping up the crevices with bushes and mud. In this way the water which is stocked with fry is diverted into rice fields: the young fish pass in to these levelled and partitioned localities, and if the water does not return to the river, but is expended in the fields, they cannot escape destruction. Even if it does return to the river, fine traps which do not permit the smallest fry to escape are fixed in every constricted place.

If we examine into what are the fish which inhabit these pieces of fresh water as well as the tanks, lakes, and marshes of India and Burma, we find most diversified forms. Some are exclusively confined to the fresh waters, while others enter rivers from the sea for breeding or to catch their prey.

The subject of the *migrations of fish* during the rains is of importance, being mostly effected for the

purpose of breeding. At the commencement of the rains they become very excited, apparently unsatisfied with the localities they inhabit, they restlessly seek a change. It is generally at this season that some have been observed travelling on land, and it has been imagined that places which are only now and then covered by water become peopled by fish in this manner after heavy showers of rain

The modes of *respiration* in some of these fishes are exceedingly curious, and have a bearing upon the question of migration. We find respiration carried on in three ways:—*First*, as is usually observed elsewhere, oxygen is obtained from air in solution in the water and which is separated at the gills, as by carps and most siluroids. If such fish have a bandage stitched round their gill-covers precluding the use of the gills, they die owing to the impossibility of taking in oxygen as described: on the same principle if the water becomes very muddy their gills become choked, respiration impeded and death ensues.* *Secondly*, we have forms on which muddy water does not produce an injurious effect on placing a bandage round the gill-covers. They never obtain oxygen for any length of time from the air in solution in the surrounding water, but inspire it direct from the atmosphere, no matter how cool and charged with air the water may be: if unable to inhale atmospheric air they become poisoned by the carbon remaining in their circulation. Such fish are to be found in the amphibious forms of *Anabas* (p. 369), *Polyacanthus* (p. 371), *Trichogaster* (p. 373), *Ophiocephalus* (p, 362), *Saccobranchus* (p. 486), etc. These fishes rise to the surface, expel a bubble of air, and at the same time take in a fresh supply (see p. 439), and this mode of respiration enables them during periodic dry seasons or in the rains to migrate from pond to pond in search of food, or to ascend small water-courses to breed during seasons of inundation when the stream is frequently intermittent. *Thirdly*, there are fish which appear to swallow air, as the loaches and spined eels (RHYNCHOBDALLIDÆ, p. 338), but no special air-breathing apparatus has as yet been detected, except that some species are stated to have portions of the intestines lined with vascular papillæ, where oxygen is abstracted from air which is first swallowed and subsequently returned by the mouth or by the anus.

A curious phenomenon in Indian fishes is the appearance of adult and healthy ones after heavy falls of rain in localities which had been dry for months previously. If when water failed in India, all the fishes in tanks which dried up were to die, none would be found for the succeeding year's supply unless migrations took place from other localities. As I and others have personally seen live fishes dug up from the ground where a tank had dried up, I do not think we are justified in rejecting the native theory that they become torpid in the mud where they *æstivate.* As the water in tanks becomes low, the fishes may be perceived congregating in holes and places where their backs are barely covered: if disturbed, they dive down into the thick mud so that a net is often ineffectual to capture them. As the water evaporates they become increasingly sluggish, and finally there is every reason to believe that some at least bury themselves in the soft mud and await in a state of torpidity the return of the next season's rains, as is well known to be the case in animals which possess a higher vitality, as *Batrachians*, some of the *Crocodiles:* also molluscs and land snails amongst the invertebrata. It may be that ova of these fishes are in the mud of these tanks with their germination retarded as we know can be accomplished by means of ice. However this may be, a few days after the rains we find numerous fry in many inundated spots.

The *strictly fresh-water forms* are divisible into those which are comparatively stationary or *non-migratory*, and secondly the *migratory* forms which find the waters of the plains unsuitable for the deposition of their ova, or else change their residence in order to obtain some peculiarly desirable description of food.

We may, therefore, first briefly allude to the breeding of the *non-migratory* fresh-water forms of the plains, some of which are monogamous others polygamous. The ubiquitous and amphibious walking fishes, OPHIOCEPHALIDÆ, are among perhaps the best known of the *monogamous* species, which as a rule do not produce such a number of ova as the migratory forms, but appear to breed oftener. Some deposit their ova in tanks, others prefer rivers where they live in deserted holes they find in the banks. When the fry are hatched they are defended by their parents until old enough to protect themselves. The *polygamous* non-migratory fishes of the plains are very numerous, and do not migrate any long distance for the purpose of breeding: in places the smaller carps are innumerable. All these forms during the rains pass up small water-courses in order to deposit their eggs in irrigated fields, flooded plains, temporarily formed tanks, or along the grassy banks of flooded rivers.

Of the *migratory* fresh-water fishes we have those which restrict their migrations to localities in the plains and others which ascend to hill streams to breed. These latter forms, as might be anticipated, are as a rule larger and stronger than the non-migratory, and they appear to return to the hill ranges to deposit their ova as naturally as some marine species enter fresh waters for this purpose.

Of the *Anadromous*, or migratory marine forms which ascend rivers in order to deposit their ova in suitable spots, we have a good example in the Hilsa or Shad (*Clupea ilisha*, p. 640). Weirs now form an insuperable bar to their ascent up some of the rivers.

The *fry* of the polygamous fresh-water fish have certain natural laws of protection. Thus they are safe from their voracious parents in hill streams and rivers, as those localities being unable to supply food to the mature forms they, having deposited their ova, drop down again into the rivers of the

* If numerous fish are seen dead on the banks of a flooded Indian river, it may be simply due to their gills having been choked by mud: should any amphibious forms however be perceived, other causes must have been in operation as poison whether introduced by man or the addition of water from jungles where it had become impregnated with poisonous vegetable substances.

plains. On the waters subsiding the fry likewise migrate down stream, but in a much more gradual manner: on the Himalayas they are often detained in the pools of the streams throughout the dry months, being unable to descend until the next year's rains. The same thing obtains in the low country in a modified form, where the fry are found to abound in flooded localities, and during the rains every little stream and piece of water connected therewith is resorted to by them to obtain food in. They are also found in sheltered spots at the edges of rivers and in shallow pieces of water where there is no current to wash them away.

During seasons of inundation many fish ascend small channels into irrigated or flooded fields for the purpose of breeding: at these times they appear to have lost much of their natural timidity and are only solicitous to reach a suitable locality to deposit their ova. During this period they are trapped throughout the length and breadth of India and Burma. Fishing weirs are permitted to extend across rivers, and "as the waters from above become unwholesome, fish attempt in vain to descend, but the owners of these weirs allow no passage, and as they die in myriads, cart them off as manure" (Official Report). "Damming, lading out and poisoning waters are freely resorted to for fishing purposes." In Oudh, "the reports from four native officials give 68,300 maunds of fry as yearly killed in their district alone." In the Madras Presidency the size of the mesh of the nets employed at the period the fry are about is variously reported as follows: Will catch a black ant, detain a mosquito, or even capture a fish egg. In Assam, it is stated, "in the shallow waters in the rice-fields women and children may be seen in crowds fishing with baskets, through the interstices of which a tadpole could not pass. Those that escape this danger, and following the flow of water, arrive at one of the innumerable little bunds separating the various paddy-fields, find their further progress barred by funnel-shaped bamboo traps, through which the water is made to pass, but whose outlets are so small that only the most minute fish can get through. Escaping to the smaller water-courses their dangers seem to increase. The channels are divided into sections by erecting bunds, and from one of these they proceed to bale out all the water, capturing every fish, large and small: they then form another bund and bale off another portion in its turn. The fish finally arriving at the smaller rivers find their exit barred by weirs which will let nothing pass, and not content with this, the Assamese will sometimes resort to poison."

The *fixed engines* are mainly constructed of cotton, hemp, aloe fibre, coir, or some such elastic material: or else of split bamboo, rattan, reed, grass, or some more or less inelastic substance. The mesh is so minute that in places water may be said to be strained through it. A common plan is to fix across a river a net shaped like a wall with a bag in the centre; towards this all the fish are driven, or even a second net is dragged towards it. Fine-meshed nets are even attached to the sluices of tanks, or to wherever water is let out of a field. In hilly districts until the first rush of the water has subsided the weirs cannot be employed, but after that they come into use, and the fish descending from their spawning beds are entrapped. In short, every conceivable variety of trap is employed by the agriculturists, while small nets or baskets of various forms and shapes are hung over weirs just above the water: breeding fish finding this barrier in their way try to overcome it by jumping, and many are captured by falling into these contrivances.

Movable fishing implements, as nets with various sized meshes, are used much as follows. When the fry are first moving about, those having a minute mesh are employed to capture the tiny creatures: as the fish become larger the size of the mesh of the net increases: small wall nets are dragged up water-courses where fry abound: purse nets are employed in similar localities. Or these movable implements may be composed of inelastic materials as already described, while some weirs are thus formed. Of the native officials reporting upon the size of the mesh or interstices of these constructions, 91 replied as follows: 5 gave the interspace between knot and knot at 1 inch: 5 at less than 1 inch: 18 at 1/2 an inch: 5 at 1/3 of an inch: 24 at 1/4 of an inch: and 34 at from 1/5 to 1/32 part of an inch.

Rivers are sometimes diverted in order to capture the fish, or streams if sluggish are dammed and laded out, or waters are poisoned, the captures being sent to neighbouring villages for disposal. Night-lines, spearing, shooting, are all in vogue to obtain the fresh-water fish. One mode of employing hooks is to fix a row on a line in a pass in a hill stream, when if the waters are very muddy some fish are hooked as they attempt to ascend to their spawning-beds or to descend after breeding: others escape horribly injured. The right of "snatching" appears to have been sold in some places by the revenue authorities; this right or amusement is thus described. A cord is armed with large iron hooks at intervals of two or three feet, by means of bits of wood they are retained with their points uppermost. This line is thrown across a stream and kept about two feet below the surface, a man on each bank holding either end. Then other persons with poles beat the water and drive the fish up stream, and as one is seen passing over this inhuman instrument of capture, the cord is jerked in order that a hook may transfix the game. Dexterity is said to have resulted from constant practice; many fish are thus captured, but more perhaps get away crippled to sicken and die a lingering death.*

Of the *vermin* which destroy fish we have many forms, but none that approach destructive man, who appears to be attempting to exterminate the supply. There is the fish-eating or long-snouted

* For the different poaching practices to catch fish employed in India and Burma and remedies proposed, see "Fresh-water Fishery Report," 1873.

crocodile, *Gavialis Gangeticus*, Gmelin, which attains upwards of 20 feet in length and is found throughout the Indus, Ganges, Jumna, Brahmaputra, Mahamuddee and their affluents. Native fishermen do not destroy them, looking upon them as fellow sportsmen. The snub-nosed or man-eating crocodiles, *Crocodilus palustris*, Less., and *C. porosus*, Schn., are found in most parts of India, and assist in depopulating the waters of fish. Otters do a considerable injury to fisheries, especially in hill streams, but I have observed one redeeming point: they destroy the large frogs which cause great destruction amongst fish ova and fry in the paddy-fields. There are many other minor enemies, as wading birds, snakes, tortoises, turtles, and the Gangetic porpoise, *Platanista Gangetica*.

But the question comes, *Of what economic value are these fresh-water fisheries?* and *What proportion of the native population of India and Burma employ fish as food?* Fish enter more into the diet of the urban than they do into that of the rural population in India, as in the former localities (if we except the Brahmans), its consumption is only limited by the amount of the supply and the cost of the article. I extract the following from official returns. In Sind fish is generally eaten except by Brahmans: in the North-West Provinces containing about 28 millions of people, out of 20 returns received, 17 give more than half the population as not forbidden by their religion to eat fish: and the same is observed in Oudh, the Bombay Presidency, Mysore and Coorg. In South Canara the collector estimated those who eat fish at 89 per cent. of the population: in Bengal proper 90 to 95 per cent.: in Assam and Chittagong nearly the entire population: while in Burma it is universally consumed in the form of *nga-pee*.*

How are the markets supplied? Out of 243 returns made by officials from the Punjab, North-West Provinces, Sind, Oudh, and the other localities already referred to, 180 observe that the markets are insufficiently supplied: 7 that they are occasionally: 3 that they are fairly so: 45 that they are fully so, but 9 of these remark that it is chiefly with marine forms which often are salted: while 8 are doubtful. Thus the markets fully supplied are not one-fifth of the total, and one-fifth of these obtain their supply from the sea.

If we now turn to the *Geographical distribution of the fresh-water fishes* of India we perceive that more than one theory has been advanced in order to explain how vertebrates obtained access to Hindustan. *Mr. Wallace* remarks that "the great land masses of the Northern hemisphere are of immense antiquity, and the area in which the higher forms of life were developed. In going back through the long series of Tertiary formations in Europe, Asia and North America we find a continuous succession of vertebrate forms including all the highest types now existing or that have existed on the earth. * * That here alone were developed the successive types of vertebrata from the highest to the lowest," and successive waves of life swept southwards. "During the Miocene period, when a sub-tropical climate prevailed over much of Europe and Central Asia, there would be no such marked contrast as that which now prevails between temperate and tropical zones; and at this time much of our Oriental region, perhaps, formed a hardly separable portion of the great Palæarctic land. But when from unknown causes, the climate of Europe became less genial, and when the elevation of the Himalayan chains and the Mongolian plateau caused an abrupt difference of climate on the northern and southern sides of that great mountain barrier, a tropical and a temperate region were necessarily formed: and many of the animals which once roamed over the greater part of the older and more extensive region, now became restricted to its southern or northern division respectively. Then came the great change we have already described opening the newly-formed plains of Central Africa to the incursions of the higher forms of Europe; and following on this, a still further deterioration in climate, resulting in that marked contrast between temperate and tropical faunas, which is now one of the most prominent features in the distribution of animal as well as of vegetable forms."

Several good zoologists have considered the African element to be very largely represented in India, or as observed by Mr. Blanford (Ann. and Mag. 1876, p. 294), its vertebrate fauna contains three elements, derived at three different periods from countries which were or had been in connection with Africa. The first of these consists of the forms common to the Ethiopian and Oriental region. These are in India the bulk of the fauna. The second consists of forms common to the Ethiopian region and India, but which do not extend to the Eastward of the Bay of Bengal: nor are they represented in the portion of South-Western Asia now lying on the direct line between India and Africa. The third is composed of species with Ethiopian affinities which may have wandered into India from Arabia and Beloochistan.

Some insight into the tenability of the foregoing opinions may perhaps be found in briefly examining the distribution of the fresh-water fishes at present existing. Although mountain chains or sandy deserts may be insuperable obstacles to the extension of fishes in certain directions, no less impassable

* *Ngapee* is a Burmese term employed for a preparation of fish or crustacea. If fish are the constituents they may be employed whole or pounded. The general mode in the former is to cut off the head of the fish, and if large it is split in two, cleaned, dried a few hours in the sun: salt is now rubbed into it, and it, along with others, is packed into a jar, from which they are removed the next day and treated in a similar manner. In large fisheries where many have to be preserved, a hole is dug in the ground where they are placed in long bamboo baskets in alternate layers of fish and salt and the whole buried for some time. There are many modes of preparing Ngapee. Of this substance the Chief Commissioner remarked:—"The quantity consumed in our territory is not known accurately, but the average yearly export to Upper Burma during the past four years has been upwards of 716,000 tons, with a value of £170,000; and the home consumption in British Burma is certainly far greater than the quantity exported."

to the fresh-water species is a tract of salt water, or a narrow arm of the sea. It is absolutely essential for the migrations of these fishes that fresh-water continuity should be unbroken, while to admit this it seems reasonable to insist that a land connection must have been present for the existence of the fresh-water to be possible. If, therefore, forms of fresh-water fishes are found in the islands of the Indian Ocean identical with those on the mainland, it does not seem unreasonable* to suppose that the two localities have been connected one with the other at some antecedent period.

Of the 87 Genera of fresh-water fishes to which I have to allude, we find the distribution to be as follow:—

5 restricted to the Himalayas or Tartarian forms.

69 in Hindustan; of these 38 extend to the Malay Archipelago.

8 restricted to Ceylon, of which 4 are found in Burma and 5 in the Malay Archipelago.

5 in Burma, 4 of which extend to the Malay Archipelago.

Out of those genera which are extended from India to the Malay Archipelago, 12 are common to Africa, India, and the Malay Archipelago: while 2 only are restricted to Africa and India, and both these forms are found in the intervening Mediterraneo-Persic sub-region. In the Indian fresh-water fishes of the present period, the Malayan element is far more developed than the African.

Of the 14 Genera at present existing in both Africa and India, we find that 9 are strictly confined to fresh waters, as in them there are no species which reside in the seas or estuaries: of these 7 are likewise found in the Mediterraneo-Persic sub-region, and it is therefore reasonable to suppose that it may have been by that route that they obtained access into India.

Of the *sub-regions of India and Burma* we have first, *the Ceylonese*, extending from Goa down the Western coast of India including Canara and Malabar, with the Western ghauts, to Ceylon: passing along the Neilgherries, its piscifauna joins with that of the Hindustan sub-region in Mysore, while in the Carnatic it in like manner passes as far as the river Kistna. 27 Genera of fresh-water fishes have been found in the island of Ceylon, all but one of which (*Channa*) are common to the mainland.

This *Ceylonese sub-region* possesses several elements in it which appear to point out the advisability of separating it from that of the plains of India. Thus we find the Genera *Pristolepis* and *Sicydium* in Malabar or Canara, absent from the plains of Hindustan, but reappearing in Burma: the *Ophiocephalus micropeltes* and the siluroid *Clarias Dussumieri*, have a nearly similar distribution. *Channa* is restricted to Ceylon and China. *Polyacanthus* is found in this sub-region, but elsewhere nowhere nearer than the Malay Archipelago; in fact one species is restricted to the island of Ceylon and to Java. *Silurus* in the Western ghauts and Himalayas, but not in the Hindustan sub-region. The Cyprinoid genus *Homaloptera* has two species on the Western ghauts identical with those on the Himalayas, but the Genus is absent from the intervening country, being otherwise restricted to Burma and the Malay Archipelago. Genus *Scaphiodon* extends from Syria to Sind and along the Western ghauts of India. The siluroid Genus *Euglyptosternum* is found both in Syria and along the base of the Himalayas. The Genus *Etroplus* is restricted to this sub-region, but a nearly allied form has been found in Madagascar. These few facts may be variously interpreted, but they appear to show that from Syria and the Mediterraneo-Persic region we have Northern forms extended along the Western ghauts of India and likewise along the base of the Himalayas. They also seem to demonstrate that some close connection must have existed in times gone by between the Ceylonese and Malayan sub-regions.

The *Hindustan sub-region* is that large alluvial tract which extends from the Himalayas and the mountain ranges of Sind southwards to meet the Ceylonese sub-region, it also embraces the valley of the Brahmaputra. Out of the 69 Genera of fresh-water fishes found in this area 54 extend to Burma, and 38 of these to the Malay Archipelago, while 15 are common to the Palæarctic region; and there is, as might be expected, a larger proportion of Burmese forms in Assam than elsewhere in India; while the Genera restricted to the area of this sub-region are no more than 5, and, with the exception of *Sisor*, it possesses no well marked local forms.

The *Himalayan sub-region* cannot be included with that of the plains of India; it is true that some varieties of fish ascend there to breed or even to reside there. Finding tropical valleys in these elevated districts suitable to their necessities, it is not surprising that following their prey up the streams, they may have been cut off from a return to the plains. Some of the tropical forms which are found there have become modified for a life in hill torrents as *Pseudecheneis* (p. 500), which possesses a sucker formed of transverse folds situated on its chest between its pectoral fins and by aid of which it keeps itself from being washed away: *Glyptosternum* (p. 496) is another siluroid genus, also with an adhesive sucker on the chest, but with longitudinal folds: the fish of this last genus (although some are found in the Himalayas) seem to be adapted more for rapid rivers of the plains: *Exostoma* (p. 501) is another remarkable form extending along the Himalayas to Thibet and China, as well as the spur or continuation southwards through Burma and Siam. But once near the summits of the Himalayas, we come across the true Tartarian or Turkestan forms. Here there are carps which have but little relationship

* I omit from this discussion the oft-repeated tale of geese swallowing fish eggs, which were subsequently voided uninjured and with their vitality unimpaired! It may be that aquatic birds have had their maws filled with fish ova and flying some short distance have disgorged such unimpaired, their vitality still remaining. The action of whirlwinds I have already adverted to.

to those of the plains of India, where only stragglers are to be occasionally found and then rarely far from the base of these mountain ranges. The SCHIZOTHORACINÆ or Hill barbels are carps more or less covered with minute scales or destitute of any. They have a membranous sac or slit anterior to the anal fin, which is laterally bounded by a row of vertically placed scales, like eave-tiles, and which are continued along the base of the anal fin. They are confined to cold regions or at least to localities possessing snow-fed rivers, many of which rivers end in lakes and do not go to the sea. They extend from Eastern Afghanistan and Western Turkestan through Tibet and the most westerly districts of China. One of the Genera (*Oreinus*) having a sucker behind the lower lip is able to exist in the rivers of the sub-Himalayan range. Here then is a group of fish which has not spread to the alluvial plains of India from the Himalayas, they being evidently residents of cold climates.

Burmese and Siamese sub-region.—Of this it is merely the Western portion or that of Burma that claims our attention. In it we find 63 Genera of fresh-water fish recorded: 4 are found in it and in the Ceylonese, but not in the Hindustan sub-region, 5 are restricted to Burma: and 54 are common to it and to the Hindustan sub-region: out of the 63 Genera 41 extend to the Malay Archipelago. But it must not be overlooked that I have included Assam in the sub-region of Hindustan, and for the following reason, owing to the Brahmaputra river entering the Gangetic system, an easy means exists for enabling fishes to belong to both deltas, in fact very many forms appear to be found in the three large watersheds of the Brahmaputra, Ganges and Indus. Similarly we find the fish-eating crocodile *Gavialis Gangeticus* common to all, but not extended to the Ceylonese sub-region nor to Burma.

Omitting for the present from whence the type forms of vertebrate life were derived, we require to know how it is that some of the identical species of fish are found along the Western ghauts of India and in the Himalayas, but absent from the sub-region of Hindustan? and how is it we see some genera identical in Ceylon and in the Malay Archipelago or in China, but absent from India and Burma?

The presence of certain Chinese, Malayan, Burmese and Siamese forms in Ceylon and in the Western ghauts, with their absence from the intervening alluvial plains of Hindustan, leads to the supposition already touched upon that, at an antecedent date some connection existed between these earlier geological formations and the more eastern countries. We observe some identical forms in the island of Ceylon and in Java or China, but absent from intervening localities: but does this prove more than that some of those intervening stations have passed away, having been perhaps submerged in the Indian Ocean? Between Ceylon and the islands of the Malay Archipelago are the Nicobars, not far removed are the Andamans. I have examined some fresh-water fishes (*Nuria*) from the Nicobars, from whence they were brought by Mr. Ball, and find them identical with the species existing in India and Burma. I have personally examined some streams at the Andamans, from which I obtained *Ophiocephalus gachua* and *Haplochilus panchax*, both common to the mainland, and these would seem to point out that a land connection may have existed between these islands and Burma, perhaps being also extended to Ceylon and the Malabar coast.

If this was the route by which fish obtained access from Malaysia to Ceylon, may they not in like manner have been diffused along the hills of Siam and Burma to the Himalayas? and this would account for such forms as *Silurus*, common to these three regions, to the two species of *Homaloptera* existing in the Western ghauts and also on the Himalayas. And when we find that the Genera *Silurus*, *Exostoma*, and to a great extent *Oreinus* are still found thriving along the whole extent of the Himalayas from Afghanistan on one hand to China or even Siam on the other, we perceive that such a view is not contrary to present existing facts.

In the alluvial plains of Hindustan there appear to be traces of two piscifaunas, one from the North conjoined with the Ethiopian, and one from the East obtained again from Malaysia by way of Burma and Assam. Whether these plains at one period had a wholly Malayan fauna as some suppose I shall not discuss, the late Dr. Stoliczka considered that such was the case, but it became more or less destroyed in those parts which were affected by the enormous volcanic eruptions, characterized as the trap formation of Central aud North-West India. It was after this time that he supposed the African element obtained access to the Hindustan sub-region, and it may have been so, but as already shown it entered (if we take fish as our guide) by way of the Mediterraneo-Persic sub-region, and we still find genera of the latter region (not found in Africa) along the Western ghauts of India (*Scaphiodon*) and also at the base of the Himalayas (*Euglyptosternum*).

Whether this element never extended to any considerable extent to Eastern Bengal or whether the Burmese forms subsequently obtained a preponderance there, or whether as seen in *Discognathus lamta*, it is still spreading, are problems requiring solution, but it is quite certain that at the present time the Malayan element is in the majority in the plains of Hindustan, due perhaps to a second wave of fish-life received from the East.

Space prevents my entering upon the question from whence these types of genera have originally been derived? Are they all or only some of Palæarctic origin? Have modifications occurred in fish as they have neared the Tropics, by which we could account for all the various families and genera which we now perceive?

I would first remark that ACANTHOPTERYGIAN or spiny-rayed forms of fresh-water fishes in India are most numerous in maritime districts, next in the deltas of large rivers, while they decrease as we proceed far inland. The CYPRINIDÆ and SILURIDÆ are the chief elements of the Indian fresh-water

fish fauna, as out of 69 Genera 35 are *Carps*, 26 *Siluroids*, and 19 *Acanthopterygians*, of which last 6 are modified by an amphibious respiration for special tropical requirement; and of these last forms the family which has the widest distribution is the amphibious *Ophiocephalidæ*, which is likewise the one in which true spines are the least developed.

The Acanthopterygian Indian fresh-water forms probably had a marine ancestry, several of the genera still having marine species, but not so the Carps. The most important genus of Indian carps is *Barbus*, possessing about 70 representatives in India, a genus which is likewise found in Europe. We find the largest forms ascending to the colder regions of the hills to deposit their ova: and the species of the genus being of the smallest size in the hot plains where they breed: along with these peculiarities we observe as a rule that similar to the European barbel, we have 4 appendages to the mouth (barbels) in the large forms, 2 in those of medium size, but none in the smaller forms of the plains. It would appear that it is not improbable that many genera of Carps are Palæarctic, their type-progenitors having been derived from a northern ancestry: but there are others, as *Homaloptera*, *Psilorhynchus*, *Semiplotus*, *Catla Thynnichthys*, *Amblypharyngodon*, *Aspidoparia*, *Rohtee*, *Chela* and their allies, which are no less of Oriental origin, and I hesitate to accept the theory that such are merely modified northern genera.

Respecting the scaleless SILURIDÆ, they as the ACANTHOPTERYGII are perhaps modified marine forms. In them the *air-vessel* or *air-bladder* possesses two distinct functional offices. In the ACANTHOPTERYGIANS where this organ is destitute of a pneumatic duct its use (excluding the question of its connection with the internal ear) appears primarily to be a mechanical one, viz., for the purpose of maintaining a required level in the water, and permitting the fish to rise or fall as desired. In the majority of carps (CYPRINIDÆ) in addition to the foregoing function, a pneumatic tube connects it with the pharynx or upper portion of the alimentary canal, and also a chain of ossicles with the internal ear. In fact, it serves both for the purpose of hearing and also for flotation. But in the sheat-fishes (SILURIDÆ) the power of employing this air-vessel as a float appears to be subservient to that of hearing. Living as they do the life of ground feeders and mostly restricted to muddy localities, this organ is more usefully restricted to acoustic purposes, while the feelers round their mouths permit them to move about with ease and safety, and their organs of hearing to ascertain the vicinity of an enemy or the approach of some incautious prey. In marine forms we meet with this air-vessel having a thick outer fibrous layer and attached to the lower surface of the bodies and transverse processes of some of the anterior vertebræ, while a chain of ossicles connects it to the internal ear. As however we pass inland or towards mountains, a change occurs, the air-vessel being partially or entirely surrounded by bone. This may be effected by a trumpet-shaped extension of the lateral processes of the first or second vertebra: or else by an expansion of the most posterior of the auditory ossicles, but in either case the chain of bones is continued to the internal ear. This being a modification of what we perceive in the Indian marine forms seems to lead to the conclusion that it is through such that the fresh-water species may have been derived.

Having briefly adverted to the fresh-water fish and fisheries, it becomes necessary to offer a few remarks upon those of the sea. They not only exist in the open sea and along the coast, but so far as tidal influence extends up large rivers, backwaters and estuaries. Opposite certain places on the coasts of the Madras Presidency, vast mud banks are present, but they are so fluid as to enable many kinds of fish to find abundance of food there, immunity from disturbance in the surrounding element such as exists in the open sea, and an excellent locality for breeding purposes.

Contrary to what obtains in the fresh-water fisheries, there is no paucity of the finny tribes in the sea, but owing to some unfortunate cause, the harvest remains comparatively untouched. But before we condemn the apathy of the native fishermen it will be as well to inquire whether a market exists for the fish were they to capture them? or is the fisherman's occupation directly or indirectly affected by laws and regulations rendering it impossible under present circumstances to carry on his trade in a profitable manner?

If the fisherman has but a limited market for fish when captured, he naturally carries on his industry where he can do so with the least amount of expense and toil, which must be effected by taking the smaller kinds that can be dried with ease, and do not require a large outlay on salt. These smaller fish prefer the vicinity of the shore where they obtain their food, but by destroying the small kinds and the crustacea, the fisherman is removing from the waters that which decoys the larger and more predaceous ones in. As a result he scares away what should be the natural supply, and to the uneducated eye the amount in the waters appears to have diminished. This does not concern the fisherman so long as his trade supplies his family requirements, neither does it occasion much injury if there is only a local demand and salt is not available for preserving the surplus.

I do not intend adverting in this place to the various modes of fishing at present being carried on along the coasts of India and Burma,* but purpose making a few remarks on the fishes of the Indian Ocean.

A considerable difference is observable in the regularity with which certain large droves of gregarious fishes as the mackerel (*Scomber microlepidotus*, p. 250) or the oil sardine (*Clupea longiceps*, p. 637)

* See description in "Report on Sea Fisheries," 1873.

appear, in some years very abundant, in others they are comparatively rare: still it is certain that those which come at particular seasons do so for breeding purposes, full of roe when they arrive, deficient in it prior to their departure, and the young being found in abundance shortly after their arrival, while they were not previously present, can lead us to no other conclusion.

The sea fisheries of India ought to be exceedingly valuable as affording an inexhaustible supply of animal food not only to those living in their vicinity, but also inland did means exist to transport the fish either in a fresh or dried state. The distance these fishes can be conveyed fresh inland depends on several causes:* the season may curtail this. In some places the captures are brought on shore in the morning and have to be taken through the sun, but on the other hand if landed in the evening coolies will not convey them during the dark to distant places. Where water facilities or those by rail exist they may be carried some distance. It is not uncommon to open and clean the fish and rub some salt earth inside which keeps it fresher than it otherwise would be, but small or immature fish decay more rapidly than larger ones. I think it may be safely assumed that fresh fish as a rule cannot be conveyed inland by coolies above ten miles so as to be sanitarily fit for human consumption: but if they are opened, cleaned, internally salted, and taken with care, by being shaded as much as possible from the sun's rays, they may be carried considerably further.

Seeing that fresh fish are obtainable only by the residents of or near the coasts while the sea is swarming with the finny tribes, we have to inquire are they captured in excess of local demands and if so how are they disposed of?

Dried fish are largely prepared along the coasts, which can be done with the smaller and thinner species, as *Equula* (p. 237), *Trichiurus* (p. 200), many of the Herrings, the Bombay duck, *Harpodon nehereus* (p. 505), and numerous others, but for the larger forms this is inappropriate unless in the form of slices cut from them and sun-dried. Sun-dried fish are found wholesale in the Bombay Presidency, but "whether fish is dried as above in preference to being salted," remarks the *Collector of Tanna*, "I have been unable to ascertain. It is very probable that it has been resorted to in the place of curing by salt, consequent on the excise duty levied on salt." As we proceed down the coast (I am here speaking from personal observations made in 1872-73), we find the people permitted to gather salt earth for this purpose, and as a consequence they prepare their fish with it in preference to its being simply sun-dried. But ascending the Coromandel coast we are told, "I believe that all the salting much of this so-called cured fish gets is being buried in the sea sand, and thus getting slightly briny" (*Collector of Trichinopoly*). Passing up the Eastern coast we find in Bengal drying in the sun the almost sole means employed for curing fish. Whereas in Burma sun-dried fish is scarcely alluded to in the official reports. This brings us face to face with the question of the reason for this, and whatever may be the cause the following are facts. Wherever salt is expensive the natives have a preference (? due to cost) to sun-dried fish: where salt is cheap,† this mode of preparation is but little employed.

Salted fish are cured with (1) monopoly or excised salt, and (2) with salt earth or spontaneous but untaxed salt. In Sind and India the best salt fish is prepared in the proportion of about 1 part of salt to 3 of fish: if salt earth is made use of nearly 3 parts of it to 1 part of fish is required.

The salt fish trade of Bombay is almost "exclusively the produce of neighbouring foreign ports," observes the *Deputy Commissioner of the Salt Revenue*, and the reason is not far to seek, as the duty per maund of salt was 29 annas in Bombay: while the cost of the whole article in these foreign ports (as Goa, Daumann, and Diu) is "2 annas a maund if as much," and where the salt is so cheap more can be afforded to be used, consequently the foreign article is superior. In the Madras Presidency excised salt is sometimes employed if the better class of salt fish is desired, as for export to Ceylon, to be taken far inland, or for personal consumption.

Salt earth or *spontaneous salt* is largely employed in places, as it is untaxed, at the same time its use for this purpose is declared illegal. But in some localities the dwellers may employ it to prepare fish for their own use, and subsequently there is no law to impede their disposing of their surplus stock. "Of this salt earth," says the *Collector of Malabar*, "the people dislike it, asserting that it imparts a bitter and unpleasant savour to food and brings on that common complaint in Malabar the itch." In *Tanjore* that fish so prepared soon becomes wormy and rotton. But the poor are unable to be too particular as to the *taste* of their food, a far more important consideration being the *cost*.

Speaking of the *cost of salt* as it was (it is raised now) a few figures will explain the foregoing. About 82 lbs. weight of salt in Madras cost about 32 annas: with this description of salt about 246 lbs. of fish could be cured; omitting wastage and the purchase of the fish we find over 4 maunds, or 328 lbs., costing 32 annas. If *untaxed salt earth* is employed the cost is from 1/6 to 1/3 of an anna a basket, which is less than 1/4 of an anna for 82 lbs. It requires, however, three times as much

* Many civil officers object to doing anything in view of the good of fisheries. One *Collector* at *Balasore* observed "the people of this district do not salt their fish, they dry it in the sun and eat it when quite putrid. They like it in this way, and there is no reason why they should be interfered with." Having personally visited this locality, I may add as a commentary that a native Zemindar's opinion was "cholera was made for these people."

† Since my investigations were completed the salt tax has been equalized in India, or raised in the Madras Presidency, and still more so in Sind. If my views are correct the returns of 1879 will show a great reduction of salted fish in Sind and a considerable falling off of the article in Madras.

of this to cure fish as it does of the excised salt. If we omit the extra weight of this salt earth we find the cost of 328 lbs. of fish thus prepared costing 1 anna instead of 32 annas, or should twice the weight of this salt to the weight of the fish be used, as is done in the better description, the cost is 2 annas instead of 32, or of a difference of 1600 per cent. in the production. The chief consumers of this article are the poorer classes, and were the taxed salt to be employed salt fish would be entirely beyond the reach of those who now purchase it.

The following figures show how the salt-fish trade has flourished on the Western coast of Madras where the people could collect the salt earth for curing the fish and how it has languished on the Eastern coast where this has not been permitted. The *exports* show as follows, the value being stated in rupees :—

5 years ending	1857-58,	Western coast,	321,950:	Eastern coast,	?
,, ,,	1862-63,	,, ,,	628,624:	,, ,,	?
,, ,,	1867-68,	,, ,,	1,118,991:	,, ,,	17,531.
,, ,,	1872-73,	,, ,,	1,780,888:	,, ,,	45,137.

In the last year the return from Travancore not having been received, an average of the five preceding years, or Rs 133,237, has been added to the total.

It appears, in short, that the fisheries are in a very depressed state wherever salt is expensive or the use of the untaxed salt earth prohibited: that they are flourishing where salt is cheap or the use of untaxed salt earth permitted: that monopoly salt is scarcely purchased for the purpose of curing fish eaten by the majority of the consumers, owing to the enormous rise it occasions in the price of the article: that fish is extensively cured with salt earth where permitted, but that such a food is a fruitful cause of disease as the article will not keep for any lengthened period, but it is preferable to the simply sun-dried article: that where the use of salt earth is prohibited, fish curers are driven to dry their fish in the sun, give up their trade, or purchase monopoly salt, and should they do this last they have to keep down the price of the article by reducing the cost of the raw fish and employing a minimum amount of salt.

SYSTEMATIC INDEX.

Sub-class, I—Teleostei.*

ORDER, I—ACANTHOPTERYGII.

Family, I—Percidæ.

PAGE

1 Lates,* *Cuv. and Val.* . . . 7
2 Cromileptes, *Swainson* . . . 8
3 Serranus, *Cuvier* . . . 9
4 Variola, *Swainson* . . . 26
5 Grammistes, *Cuvier* . . . 27
6 Diploprion, *Cuv. and Val.* . . 28
7 Myriodon, *Bris.* . . . 747
8 Lutianus, *Bloch* . . . 29
9 Priacanthus, *Cuv. and Val.* . 48
10 Ambassis, *Cuv. and Val.* . . 49
11 Apogon, *Lacépède* . . . 56
12 Cheilodipterus, *Cuv. and Val.* . 65
13 Dules, *Cuv. and Val.* . . . 67
14 Therapon, *Cuv.* . . . 68
15 Datnia, *Cuv. and Val.* . . 71
16 Helotes, *Cuv.* 72
17 Pristipoma, *Cuv.* . . . 72
18 Hapalogenys, *Rich.* . . . 76
19 Diagramma, *Cuv.* . . . 77
20 Lobotes, *Cuv.* 83
21 Scolopsis, *Cuv. and Val.* . . 84
22 Dentex, *Cuv.* 89
23 Synagris *Günther* . . . 90
24 Aprion, *Cuv. and Vall.* . . 746
25 Pentapus, *Cuv.* 93
26 Smaris, *Cuv.* 94
27 Cæsio, *Cuv.* 94
28 Datnioides, *Bleeker* . . . 96
29 Gerres, *Cuv.* 96
30 Pentaprion, *Bleeker* . . . 101

Family, II—Squamipinnes.

1 Chætodon, *Cuv.* . . . 103
2 Chelmo, *Cuv.* 109
3 Heniochus, *Cuv. and Val.* . . 110
4 Zanclus, *Cuv. and Val.* . . 111
5 Holacanthus, *Lacép.* . . . 111
6 Scatophagus, *Cuv. and Val.* . 114
7 Ephippus, *Cuv.* 115
8 Drepane, *Cuv. and Val.* . . 115
9 Toxotes, *Cuv.* . . . 116

Family, III—Mullidæ.

1 Upeneoides, *Bleeker* . . . 119
2 Mulloides, *Bleeker* . . . 122
3 Upeneus, *Bleeker* . . . 123

Family, IV—Nandidæ.

1 Plesiops, *Cuvier* . . . 127
2 Badis, *Bleeker* . . . 128
3 Nandus, *Cuv. and Val.* . . 129
4 Pristolepis, *Jerdon* . . . 130

Family, V—Sparidæ.

PAGE

1 Crenidens, *Cuv. and Val.* . . 132
2 Sargus, *Cuv.* 133
3 Lethrinus, *Cuv.* . . . 134
4 Sphærodon, *Rüppell* . . . 138
5 Pagrus, *Cuv.* 138
6 Chrysophrys, *Cuv.* . . . 139
7 Pimelepterus, *Cuv.* . . . 142

Family, VI—Cirrhitidæ.

1 Cirrhites, *Cuv.* 144
2 Cirrhitichthys, *Bleeker* . . 145

Family, VII—Scorpænidæ.

1 Sebastichthys, *Gill.* . . . 148
2 Scorpæna, *Artedi* . . . 149
3 Scorpænopsis, *Heckel* . . . 150
4 Pterois, *Cuv.* 152
5 Apistus, *Cuv.* 154
6 Centropogon, *Günther* . . 155
7 Gymnapistus, *Swains.* . . 156
8 Amblyapistus, *Bleeker* . . 157
9 Micropus, *Gray* . . . 158
10 Minous, *Cuv. and Val.* . . 159
11 Cocotropus, *Kaup.* . . . 159
12 Pelor, *Cuv. and Val.* . . . 160
13 Choridactylus, *Richard.* . . 161
14 Synancidium, *Müll.* . . . 162
15 Synanceia, *Bl. Schn.* . . . 163
16 Pseudosynanceia, *Day* . . 163
17 Polycaulis, *Günther* . . . 163

Family, VIII—Teuthididæ.

1 Teuthis, *Linn.* 165

Family, IX—Berycidæ.

1 Myripristis, *Cuv.* . . . 169
2 Holocentrum, *Artedi* . . . 170

Family, X—Kurtidæ.

1 Kurtus, *Bloch* 174
2 Pempheris, *Cuv. and Val.* . . 175

Family, XI—Polynemidæ.

1 Polynemus, *Linn.* . . . 176

Family, XII—Sciænidæ.

1 Umbrina, *Cuv.* 181
2 Sciæna, *Cuv.* 184
3 Sciænoides, *Blyth* . . . 193
4 Otolithus, *Cuv.* 195

Family, XIII—Xiphiidæ.

1 Histiophorus, *Lacép.* . . . 198

Family, XIV—Trichiuridæ.

1 Trichiurus, *Linn.* . . . 200

Family, XV—Acanthuridæ.

PAGE

1 Acanthurus, *Bloch* . . . 202
2 Naseus, *Commerson* . . . 208

Family, XVI—Carangidæ.

1 Caranx, *Lacép.* 210
2 Micropteryx, *Agass.* . . . 226
3 Seriola, *Cuv.* 227
4 Seriolichthys, *Bleeker* . . . 228
5 Naucrates, *Cuv.* . . . 228
6 Chorinemus, *Cuv. and Val.* . 229
7 Trachynotus, *Cuv. and Val.* . 232
8 Psettus, *Cuv. and Val.* . . 234
9 Platax, *Cuv. and Val.* . . 235
10 Equula, *Cuv. and Val.* . . 237
11 Gazza, *Rüpp.* 243
12 Lactarius, *Cuv. and Val.* . . 244

Family, XVIa—Nomeidæ.

1 Psenes, *Cuv. and Val.* . . 237

Family, XVII—Stromateidæ.

1 Stromateus, *Artedi* . . . 246

Family, XVIII—Coryphænidæ.

1 Coryphæna, *Cuv. and Val.* . . 248
2 Mene, *Lacép.* 249

Family, XIX—Scombridæ.

1 Scomber, *Artedi* . . . 250
2 Thynnus, *Cuv. and Val.* . . 251
3 Cybium, *Cuv.* 254
4 Elacate, *Cuv.* 256
5 Echeneis, *Artedi* . . . 257

Family, XX—Uranoscopidæ.

1 Uranoscopus, *Cuv.* . . . 260
2 Ichthyscopus, *Swains.* . . 261

Family, XXI—Trachinidæ.

1 Percis, *Bl. Schn.* . . . 262
2 Sillago, *Cuv.* 264

Family, XXII—Pseudochromides.

1 Opisthognathus, *Cuv.* . . . 266
2 Pseudochromis, *Rüpp.* . . 267

Family, XXIII—Batrachidæ.

1 Batrachus, *Bl. Schn.* . . 269

Family, XXIV—Pediculati.

1 Antennarius, *Cuv.* . . . 271
2 Halieutæa, *Cuv. and Val.* . . 273

Family, XXV—Cottidæ.

1 Platycephalus, *Bl. Schn.* . . 274

* A synopsis is given of all the species in each genus immediately following the definition.

PAGE

FAMILY, XXVI—CATAPHRACTI.

1 Dactylopterus, *Lacép.* . . . 279
2 Pegasus, *Linn.* 279

FAMILY, XXVII—GOBIIDÆ.

1 Gobius, *Artedi* 282
2 Gobiodon, *Bleeker* . . . 297
3 Sicydium, *Cuv. and Val.* . . 298
4 Apocryptes, *Cuv. and Val.* . . 299
5 Apocryptichthys, *Day* . . 302
6 Periophthalmus, *Bl. Schn.* . . 303
7 Boleophthalmus, *Cuv. and Val.* . 304
8 Bostrichthys, *C. Duméril* . . 308
9 Eleotris, *Gronov* 309
10 Gobioides, *Lacép.* 316
11 Trypauchen, *Cuv. and Val.* . 319

FAMILY, XXVIII—CALLIONYMIDÆ.

1 Callionymus, *Linn.* 321

FAMILY, XXIX—CEPOLIDÆ.

1 Cepola, *Linn.* 324

FAMILY, XXX—BLENNIDÆ.

1 Blennius, *Artedi* 325
2 Petroscirtes, *Rüppell* . . . 326
3 Salarias, *Cuv.* 328
4 Andamia, *Blyth* 335
5 Tripterygium, *Risso* . . . 336
6 Xiphasia, *Swainson* . . . 336

FAMILY, XXXI—RHYNCHOBDELLIDÆ.

1 Rhynchobdella, *Bl. Schn.* . . 338
2 Mastacembelus, *Cuv. and Val.* . 339

FAMILY, XXXII—SPHYRÆNIDÆ.

1 Sphyræna, *Artedi* 342

FAMILY, XXXIII—ATHERINIDÆ.

1 Atherina, *Artedi* 344

FAMILY, XXXIV—MUGILIDÆ.

1 Mugil, *Artedi* 346

FAMILY, XXXV—AULOSTOMATIDÆ.

1 Fistularia, *Linn.* 360

FAMILY, XXXVI—CENTRISCIDÆ.

1 Amphisile, *Cuv.* 361

FAMILY, XXXVII—OPHIOCEPHALIDÆ.

1 Ophiocephalus, *Bloch* . . . 363
2 Channa, *Gronov.* 368

FAMILY, XXXVIII—LABYRINTHICI.

1 Anabas, *Cuv.* 369
2 Polyacanthus, *Cuv. and Val.* . 371
3 Osphromenus, *Lacép.* . . . 371
4 Trichogaster, *Bl. Schn.* . . 373

FAMILY, XXXIX—TRACHYPTERIDÆ.

1 Regalecus, *Brünn.* 376

FAMILY, XL—GLYPHIDODONTIDÆ.

1 Amphiprion, *Bl. Schn.* . . . 377
2 Premnas, *Cuv.* 380
3 Tetradrachmum, *Cantor* . . 380
4 Pomacentrus, *Cuv.* 381
5 Glyphidodon, *Cuv.* 384
6 Heliastes, *Cuv. and Val.* . . 388

FAMILY, XLI—LABRIDÆ.

1 Chærops, *Rüpp.* 391
2 Cossyphus, *Cuv. and Val.* . . 391
3 Labroides, *Bleeker* . . . 392
4 Cheilinus, *Cuv.* 393
5 Epibulus, *Cuv.* 394
6 Anampses, *Cuv.* 395
7 Hemigymnus, *Günther* . . . 395
8 Stethojulis, *Günther* . . . 396
9 Platyglossus, *Günther* . . . 397
10 Novacula, *Cuv. and Val.* . . 401
11 Julis, *Cuv. and Val.* . . . 403
12 Gomphosus, *Lacép.* 405
13 Cheilio, *Lacép.* 406
14 Coris, *Lacép.* 407
15 Cymolutes, *Günther* . . . 408
16 Pseudodax, *Bleeker* . . . 409
17 Scarichthys, *Bleeker* . . . 409
18 Callyodon, *Cuv. and Val.* . . 410
19 Pseudoscarus, *Bleeker* . . . 410

FAMILY, XLII—CHROMIDES.

1 Etroplus, *Cuv. and Val.* . . 414

ORDER, II—ANACANTHINI.

FAMILY, I—GADIDÆ.

1. Bregmaceros, *Thompson* . . 417

FAMILY, II—OPHIDIIDÆ.

1 Brotula, *Cuvier* 419
2 Ammodytes, *Artedi* 419

FAMILY, III.—PLEURONECTIDÆ.

1 Psettodes, *Bennett* 421
2 Citharichthys, *Bleeker* . . . 422
3 Pseudorhombus, *Bleeker* . . 422
4 Platophrys, *Swainson* . . . 425
5 Solea, *Klein* 425
6 Achirus, *Cuv.* 427
7 Synaptura, *Cuvier* 428
8 Plagusia, *Cuv.* 431
9 Cynoglossus, *Ham.-Buch.* . . 431

ORDER, III—PHYSOSTOMI.

FAMILY, I—SILURIDÆ.

1 Macrones, *Dum.* 442
2 Leiocassis, *Bleeker* . . . 451
3 Erethistes, *Müll. and Trosch.* . 452
4 Rita, *Bleeker* 454
5 Arius, *Cuv. and Val.* . . . 456
6 Batrachocephalus, *Bleeker* . . 468
7 Ketengus, *Bleeker* 468
8 Osteogeniosus, *Bleeker* . . 469
9 Pangasius, *Cuv. and Val.* . . 469
10 Pseudeutropius, *Bleeker* . . 470
11 Olyra, *McClell.* 474
12 Callichrous, *Ham.-Buch.* . . 475
13 Wallago, *Bleeker* 479
14 Silurus, *Artedi* 480
15 Chaca, *Cuv. and Val.* . . . 481
16 Plotosus, *Lacép.* 482
17 Clarias, *Gronov.* 483
18 Saccobranchus, *Cuv. and Val.* . 486
19 Silundia, *Cuv. and Val.* . . 487
20 Ailia, *Gray* 488
21 Ailichthys, *Day* 489
22 Entropiichthys, *Bleeker* . . 489
23 Amblyceps, *Blyth* 490
24 Sisor, *Ham.-Buch.* 491
25 Gagata, *Bleeker* 492
26 Bagarius, *Bleeker* 495
27 Glyptosternum, *McClell.* . . 496
28 Euglyptosternum, *Bleeker* . . 499
29 Pseudecheneis, *Blyth* . . . 500
30 Exostoma, *Blyth* 501

FAMILY, II—SCOPELIDÆ.

1 Saurus, *Cuv.* 503
2 Saurida, *Cuv.* 504
3 Harpodon, *Lesueur* . . . 505
4 Scopelus, *Cuvier* 506

FAMILY,—SALMONIDÆ.

1 Salmo (introduced) . . . 508

FAMILY, III—SCOMBRESOCIDÆ.

1 Belone, *Cuv.* 509
2 Hemiramphus, *Cuv.* . . . 512
3 Exocætus, *Artedi* 518

FAMILY, IV—CYPRINODONTIDÆ.

1 Cyprinodon, *Lacép.* . . . 521
2 Haplochilus, *McClell.* . . . 521

FAMILY, V—CYPRINIDÆ.

SUB-FAMILY, I—CYPRININA.

1 Homaloptera, *v. Hass* . . . 525
2 Psilorhynchus, *McClell.* . . 526
3 Discognathus, *Heckel* . . . 527
4 Oreinus, *McClell.* 529
5 Schizopygopsis, *Steind.* . . 531
6 Schizothorax, *Heckel* . . . 531
7 Ptycobarbus, *Steind.* . . . 533
8 Diptychus, *Steind.* 534
9 Labeo, *Cuv.* 534
10 Osteochilus, *Günther* . . . 545
11 Dangila, *Cuv. and Val.* . . 546
12 Cirrhina, *Cuv. and Val.* . . 547
13 Semiplotus, *Bleeker* . . . 549
14 Scaphiodon, *Heckel* . . . 550
15 Carassius, *Nilsson* (? introduced) 552
16 Catla, *Cuv. and Val.* . . . 553
17 Thynnichthys, *Bleeker* . . . 554
18 Amblypharyngodon, *Bleeker* . 554
19 Barbus, *Cuv. and Val.* . . . 556
20 Nuria, *Cuv. and Val.* . . . 582
21 Rasbora, *Bleeker* 583
22 Aspidoparia, *Bleeker* . . . 585
23 Rohtee, *Sykes* 586
24 Barilius, *Ham.-Buch.* . . . 588
25 Danio, *Ham.-Buch.* 594
26 Perilampus, *McClell.* . . . 598
27 Chela, *Ham.-Buch.* 599

SUB-FAMILY, II—COBITIDINA.

1 Botia, *Gray* 606
2 Acanthopsis, *v. Hass* . . . 608
3 Somileptes, *Bleeker* . . . 608
4 Lepidocephalichthys, *Bleeker* . 609
5 Acanthophthalmus, *v. Hass.* . 610
6 Apua, *Blyth* 611
7 Jerdonia, *Day* 611
8 Nemacheilichthys, *Day* . . 611
9 Nemacheilus, *v. Hass* . . . 612

FAMILY, VI—CLUPEIDÆ.

1 Engraulis, *Cuv.* 624
2 Coilia, *Gray* 630
3 Chatoessus, *Cuv. and Val.* . . 632
4 Clupea, *Artedi* 634
6 Corica, *Ham.-Buch.* 642
5 Pellona, *Cuv. and Val.* . . . 642
7 Opisthopterus, *Gill.* . . . 646
8 Raconda, *Gray* 646
9 Dussumieria, *Cuv. and Val.* . 647
10 Spratelloides, *Bleeker* . . . 648
11 Albula, *Gronov.* 648
12 Elops, *Linn.* 649
13 Megalops, *Comm.* 650
14 Chanos, *Lacép.* 651

PAGE

FAMILY, VII—CHIROCENTRIDÆ.

1 Chirocentrus, *Cuv.* 652

FAMILY, VIII—NOTOPTERIDÆ.

1 Notopterus, *Lacép.* 653

FAMILY, IX—SYMBRANCHIDÆ.

1 Amphipnous, *Müll.* 655
2 Monopterus, *Lacép.* 656
3 Symbranchus, *Bloch* 657

FAMILY, X—MURÆNIDÆ.

1 Anguilla, *Cuv.* 659
2 Congromuræna, *Kaup.* . . . 660
3 Uroconger, *Kaup.* 661
4 Muræncsox, *McClell.* 661
5 Saurenchelys, *Peters* 663
6 Murenichthys, *Bleeker* . . . 663
7 Ophichthys, *Ahl.* 663
8 Moringua, *Gray* 666
6 Muræna, *Artedi* 667
10 Gymnomuræna, *Lacép.* . . . 674

ORDER, IV—LOPHOBRANCHII.

FAMILY, I—SYNGNATHIDÆ.

1 Synguathus, *Artedi* 677
2 Ichthyocampus, *Kaup.* . . . 679
3 Doryichthys, *Kaup.* 679
4 Nerophis, *Rafin.* 680
5 Gastrotokeus, *Kaup.* 681
6 Acentronura, *Kaup.* 681
7 Hippocampus, *Leach* 681

PAGE

ORDER, V—PLECTOGNATHI.

FAMILY, I—SCLERODERMI.

1 Triacanthus, *Cuv.* 684
2 Balistes, *Artedi* 666
3 Monacanthus, *Cuv.* 692
4 Anacanthus, *Gray* 694
5 Ostracion, *Artedi* 695

FAMILY, II—GYMNODONTES.

1 Triodon, *Cuv.* 698
2 Xenopterus, *Dum.* 699
3 Tetrodon, *Linn.* 699
4 Diodon, *Cuv.* 708

Sub-class, II—Chondropterygii.

ORDER, I—PLAGIOSTOMATA.

SUB-ORDER, I—SELACHOIDEI.

FAMILY, I—CARCHARIIDÆ.

1 Carcharias, *Müll. and Henle* . 710
2 Hemigaleus, *Bleeker* . . . 717
3 Galeocerdo, *Müll. and Henle* . 718
4 Zygæna, *Cuv.* 719
5 Triænodon, *Müll. and Henle* . 720
6 Mustelus, *Cuv.* 720

FAMILY, II—LAMNIDÆ.

1 Lamna, *Cuv.* 722

FAMILY, III—NOTIDANIDÆ.

1 Notidanus, *Cuv.* 723

PAGE

FAMILY, IV—SCYLLIIDÆ.

1 Scyllium, *Cuv.* 724
2 Ginglymostoma, *Müll. and Henle* 725
3 Stegostoma, *Müll. and Henle* . 725
4 Chiloscyllium, *Müll. and Henle* . 726

SUB-ORDER, II—BATOIDEI.

FAMILY, I—PRISTIDÆ.

1 Pristis, *Latham* 728

FAMILY, II—RHINOBATIDÆ.

1 Rhynchobatus, *Müll. and Henle* . 730
2 Rhinobatus, *Bl. Schn.* . 731

FAMILY, III—TORPEDINIDÆ.

1 Narcine, *Henle* 733
2 Astrape, *Müll. and Henle* . . 733

FAMILY, IV—RAJIDÆ.

1 Platyrhina, *Müll. and Henle* . 735

FAMILY, V—TRYGONIDÆ.

1 Urogymnus, *Müll. and Henle* . 736
2 Trygon, *Adanson* . . . 736
3 Tæniura, *Müll. and Henle* . . 740
4 Pteroplatea, *Müll. and Henle* . 741

FAMILY, VI—MYLIOBATIDÆ.

1 Myliobatis, *Cuvier* . . . 742
2 Ætobatis, *Müll. and Henle* . . 743
3 Rhinoptera, *Kuhl.* . . . 743
4 Dicerobatis, *Blainv.* . . . 744
5 Ceratoptera, *Müll. and Henle* . 745

THE FISHES OF INDIA.

CLASS PISCES.

Vertebrate animals which are, as a rule, exclusively adapted for an aquatic life, and have their extremities modified into fins. Respiring, almost invariably, solely by means of gills:* possessing a heart with only two cavities, and being cold-blooded. They are scaleless, partially or wholly scaled, the scales being sometimes in the form of osseous plates.

SYNOPSIS OF SUB-CLASSES.

I. TELEOSTEI or ELEUTHEROBRANCHII. Skeleton osseous. Brain distinct. Skull possessing cranial bones. Vertebræ completely separated, and the posterior extremity of the vertebral column bony, or having bony plates. Branchiæ free, and the water discharged through a single aperture on either side, protected by a bony gill-cover or opercle: branchiostegal rays present. A non-contractile bulbus arteriosus, having a pair of valves at its commencement.

II. CHONDROPTERYGII or ELASMOBRANCHII. Skeleton cartilaginous. Brain distinct. Skull without cranial sutures. Gills pouch-like, and attached by their outer edge to the skin, whilst an intervening gill-opening exists between each. No gill-cover. Bulbus arteriosus contractile, and having three rows of valves at its commencement.

SYNOPSIS OF ORDERS AMONGST THE TELEOSTEI.

I. ACANTHOPTERYGII. A portion of the dorsal, anal, and ventral fins unarticulated, forming spines.† Air-vessel, when present, completely closed, not possessing a pneumatic duct.

II. ANACANTHINI. All the rays of the vertical and ventral fins articulated; the latter, when present, being jugular and thoracic.

III. PHYSOSTOMI. All the fin rays articulated, with the exception of the first in the dorsal and pectoral which sometimes are more or less ossified. Ventral fins, when present, abdominal and spineless. Air-vessel, if existing, having a pneumatic duct (except in *Scombresocidæ*).

IV. LOPHOBRANCHII. Fishes possessing a dermal segmental skeleton, with the opercular pieces reduced to a single plate. Gill-openings small. Gills consisting of small rounded tufts, attached to the branchial arches. Muscular system very slightly developed. Snout produced: mouth terminal, but small. Teeth absent. Air-vessel stated to be destitute of a pneumatic duct.

V. PLECTOGNATHI. Fishes with the bones of the head completely ossified, whilst those in the remainder of the body are incompletely so: vertebræ few. Gill-openings small, situated in front of the pectoral fins. Gills pectinate. Head generally large. Mouth narrow: the bones of the upper jaw mostly united, sometimes produced into the form of a beak. Teeth in the jaws absent or present. There may be a single soft-rayed dorsal fin, belonging to the caudal portion of the vertebral column, and situated opposite the anal: in some a rudimental spinous dorsal is also present: ventrals when existing, have the form of spines. Skin either smooth, with rough scales, or ossified in the form of plates or spines. Air-vessel destitute of a pneumatic duct.

Geographical distribution. The Acanthopterygian Fishes do not exist in any numbers in the inland fresh-waters of India, being mostly confined to either within, or but a short distance removed from tidal

* Certain fish as the *Labyrinthici* and *Ophiocephalidæ* can live in water even with a bandage fastened round their gills, entirely preventing their use for respiratory purposes, provided they can obtain direct access to atmospheric air. Such a proceeding would however be fatal to the majority of fishes, thus showing that some forms possess means of depurating their blood which are not present to all.

† There are some genera in which the fins can hardly be said to possess any true spines as amongst the *Trachinidæ*, *Aulostomatidæ*, *Trachinidæ*, &c.

influence, or above the sea level. The larger the river, the greater is the probability of their extending their range up it. The hard rayed fishes captured in the fresh waters, mostly belong to one of the following genera. *Lates*, *Ambassis*, *Nandus*, *Badis*, *Pristolepis*, *Sciæna*, *Equula*, *Gobius* and allied genera, *Mugil*, members of the *Labyrinthiform* and *Ophiocephaloid* families, as well as the spined eels, and the *Etropli*.

SYNOPSIS OF FAMILIES AMONGST THE ACANTHOPTERYGII.*

First Group—Perciformes.

Body elevated or oblong, not elongate. No superbranchial organ. Spinous dorsal well developed, the soft dorsal similar to the soft anal: ventrals thoracic, 1/4 or 1/5.† Vent remote from the end of the tail, and posterior to the ventral fins. No prominent anal papilla.

1. *Percidæ*. Preopercle not articulated with the orbit. Neither molars nor cutting teeth. Vertical fins generally scaleless. Lateral line almost invariably present and uninterrupted.‡
2. *Squamipinnes*. Preopercle not articulated with the orbit. Body mostly elevated and compressed. Neither molars nor cutting teeth, setiform ones may exist in the jaws, or villiform ones on the palate. Vertical fins scaled. Lateral line uninterrupted.
3. *Mullidæ*. Preopercle not articulated with the orbit. Teeth feeble, jaws and palate variously armed or edentulous. Two long and stiff barbels below the chin.
4. *Nandidæ*. Preopercle not articulated with the orbit. Teeth feeble, but dentition more or less complete. Lateral line interrupted or absent.
5. *Sparidæ*. Preopercle not articulated with the orbit. Either rows of cutting or conical teeth in the front of the jaws, or a lateral row of molars, or both conjoined.
6. *Cirrhitidæ*. Preopercle not articulated with the orbit. Neither cutting nor molar teeth. Lower pectoral rays unbranched.
7. *Scorpænidæ*. Preopercle articulated with the orbit. Some of the bones of the head armed.
8. *Teuthididæ*. Each ventral fin having two spines and three intermediate soft rays.

Second group—Beryciformes.

Body oblong or elevated. Head with large, subcutaneous, muciferous cavities. Ventral fins thoracic, each with a spine, and less or more than five soft rays. Vent remote from the end of the tail, and posterior to the ventral fins.

9. *Berycidæ* as defined for the group.

Third group—Kurtiformes.

Body strongly compressed. A single dorsal fin, much less developed than the anal. Vent remote from the end of the tail, and posterior to the ventral fins.

10. *Kurtidæ* as defined for the group.

Fourth group—Polynemiformes.

Mouth on the lower side of a prominent snout: muciferous system on the head well developed. Two rather short dorsal fins: several free and articulated filaments below each pectoral. Scales more or less covering the vertical fins. Vent remote from the end of the tail, and posterior to the ventral fins.

11. *Polynemidæ* as defined for the group.

Fifth group—Sciæniformes.

Muciferous system on the head well developed. The second dorsal fin much more developed than the first, or the anal: no pectoral filaments. Vent remote from the end of the tail, and posterior to the ventral fins.

12. *Sciænidæ* as defined for the group.

Sixth group—Xiphiiformes.

The upper jaw produced into a long, sword-like process. Vent remote from the end of the tail, and posterior to the ventral fins.

13. *Xiphiidæ* as defined for the group.

* This synopsis of the Families of Acanthopterygian fishes existing in India, is taken, with as slight alterations as possible, from the elaborate one in the British Museum Catalogue of Fish, Vol. iii, Appendix. By adhering to this, it has been considered, that reference to the specimens in the national collection would be facilitated.

† There are exceptions; thus in some genera amongst the *Scorpænidæ*, the rays are rudimentary, and in *Teuthididæ* the ventral fin has 2/3.

‡ For exceptions, see Genus *Ambassis*, also Poey has recorded from Cuba a Genus nearly allied to *Lutianus*, but which, amongst other things, is distinguished by having an interrupted lateral line.

Seventh group—Trichiuriformes.

Body band-like and compressed. Cleft of mouth deep. Teeth in jaws and palate, several being strong and conical. Dorsal and anal fins many rayed: ventrals, when present, in the form of a pair of scales: caudal absent or forked. Vent remote from the end of the tail, and posterior to the ventral fins when such are present.

14. *Trichiuridæ*, as defined for the group.

Eighth group—Cotto-scombriformes.

Dorsal fins placed close together or continuous, having fewer spines than rays, or the spinous portion may be modified into tentacles, detached spines, or a suctorial disk: anal similar to the soft dorsal, sometimes both fins are modified posteriorly into finlets: ventrals, when present, jugular or thoracic, never forming a sucker. No prominent anal papilla. Vent remote from the end of the tail, and posterior to the ventral fins, when such are present.

15. *Acanthuridæ*. A single dorsal fin with less spines than rays. One or more bony spines on either side of the tail in the adult.

16. *Carangidæ*. Preopercle not articulated with the orbit. Body oblong, elevated, or subcylindrical and compressed. Teeth, when present, villiform or conical. Spinous portion of the dorsal fin sometimes rudimentary: the posterior rays of the dorsal and anal, may consist of detached finlets: ventrals, when present, thoracic. Vertebræ 10/14 (*Naucrates* 10/16).

17. *Stromateidæ*. Preopercle not articulated with the orbit. Body oblong, and compressed. Barbed teeth extend into the œsophagus. One long dorsal fin without any distinct spinous portion. Vertebræ exceed 10/14.

18. *Coryphænidæ*. Preopercle not articulated with the orbit. Body oblong or elevated, and compressed. No teeth in the œsophagus. One long dorsal fin without any distinct spinous portion. Vertebræ exceed 10/14.

19. *Nomeidæ*. Preopercle not articulated with the orbit. Body oblong, more or less compressed. Two dorsal fins, the spinous sometimes continuous with the soft portion, finlets occasionally present: anal spines mostly indistinct: caudal forked. Scales cycloid, of moderate or small size. Vertebræ exceed 10/14.

20. *Scombridæ*. Preopercle not articulated with the orbit. Body oblong, or slightly elongated and compressed. Two dorsal fins, the first being sometimes modified into free spines, or an adhesive disk, whilst the posterior dorsal and anal rays may be in the form of finlets. Scales, if present, small.

21. *Trachinidæ*. Preopercle not articulated with the orbit. Body low and more or less elongated. One or two dorsal fins. Vertebræ exceed 10/14.

22. *Batrachidæ*. Preopercle not articulated with the orbit. Body low, and more or less elongated. First dorsal fin consisting of a few free spines: ventrals jugular 1/2.

23. *Pediculati*. Preopercle not articulated with the orbit. The spinous dorsal, when present, composed of a few isolated spines which may be modified into tentacles: carpal bones forming a sort of arm for the pectoral fin: ventrals, when present, jugular, having four or five rays.

24. *Cottidæ*. Preopercle articulated with the orbit. Body more or less elongated. Some of the bones of the head usually armed. Pectoral fins with, or without filamentous appendages: ventrals thoracic. Body scaleless, scaled, or with a single row of plate-like scales.

25. *Cataphracti*. Preopercle articulated with the orbit. Head and body, more or less angular, cuirassed with plates, or keeled scales covering the body.

Ninth group—Gobiiformes.

Spinous dorsal short and composed of flexible spines, the soft dorsal and anal being of equal extent: ventrals when present, thoracic or jugular, having 1/5 or 1/4. A prominent anal papilla. Vent remote from the end of the tail, and posterior to the ventral fins when such are present.

26. *Gobiidæ*. Preopercle not articulated with the orbit. Ventrals either united so as to form a disk, or else placed close together: anal spines may be absent.

27. *Callionymidæ*. Preopercle not articulated with the orbit. Two dorsal fins, the first with from four to six flexible spines: ventrals wide apart.

Tenth group—Bleniiformes.

Body elongated and more or less cylindrical. Spinous portion of dorsal fin when distinct, may be as fully or even more developed than the soft part: anal more or less elongated: ventrals, if present, thoracic or jugular: caudal, when present, sometimes sub-truncated or rounded. Vent remote from the end of the tail, and posterior to the ventral fins when such are present.

28. *Blenniidæ*. Preopercle not articulated with the orbit. Ventral fins when present, jugular: anal spines few, or absent. Often a prominent anal papilla.

29. *Rhynchobdellidæ*. Body eel-like. Anterior portion of the dorsal fin consisting of numerous free spines: ventrals absent. No prominent anal papilla.

Eleventh group—Mugiliformes.

Two distinct dorsal fins, the anterior short, or similar to the posterior: ventrals well developed, abdominal, 1/5. Vent remote from the end of the tail and posterior to the ventral fins.

30. *Sphyrænidæ.* Body elongate, sub-cylindrical. Teeth large and cutting. Vertebræ 24.

31. *Atherinidæ.* Body more or less elongated, and somewhat sub-cylindrical. Dentition feeble, or moderate. Vertebræ usually exceeding 10/14.

32. *Mugilidæ.* Body more or less elongated, and somewhat sub-cylindrical. Dentition feeble. First dorsal fin consisting of four stiff spines. Vertebræ 24.

Twelfth group—Gasterosteiformes.

The spinous dorsal, when present, short or formed of isolated spines: ventrals abdominal* sometimes imperfectly developed. Vent remote from the end of the tail, and posterior to the ventral fins, when they are present.

33. *Aulostomateidæ.* Anterior bones of the head forming a tube having a small mouth at its extremity. Ventral fins with six rays.

34. *Centriscidæ.* Anterior bones of the head forming a tube having a small mouth at its extremity. Two dorsal fins, the first short, the soft and the anal of moderate extent: ventrals imperfectly developed.

Thirteenth group—Channiformes.

Body elongate. No labyrinthiform superbranchial organ, but a bony prominence on the epitympanic bone. Dorsal and anal fins long, all destitute of spines. Vent remote from the end of the tail, and posterior to the ventral fins, when such are present.

35. *Ophiocephalidæ.* Ventral fins present, or absent.

Fourteenth group—Labyrinthibranchii.

Body compressed, oblong or elevated. A labyrinthiform superbranchial organ arising from the branchial arches, and employed for respiratory purposes. Vent remote from the end of the tail, and posterior to the ventral fins.

36. *Labyrinthici.* Dorsal and anal spines present, and often numerous.

Fifteenth group—Trachypteriformes.

Body elongate and strongly compressed. Skeleton soft. Dentition feeble. Anal fin absent: caudal not in the longitudinal axis of the fish, or else rudimentary: ventrals thoracic.

37. *Trachypteridæ* as defined for the group.

Sixteenth group—Labriformes.

Body oblong, elongated, or elevated and compressed. The lower pharyngeal bones coalesced along the median line, and with or without a median longitudinal suture. A single dorsal fin, the number of spines and rays being nearly equal: soft anal similar to the soft dorsal: ventrals 1/5, thoracic.

38. *Pomacentridæ.* Bones of the head may be armed, or smooth. Scales ctenoid.

39. *Labridæ.* Scales cycloid.

* Dr. Günther observes that in the *Aulostomateidæ* "the ventrals have an abdominal position in consequence of the prolongation of the pubic bones, which are attached to the humeral arch." In the *Centriscidæ*, on the contrary, we find the "ventral fins truly abdominal, imperfectly developed."

Family, I—PERCIDÆ.

Percoidei, pt., *Sciœnoidei*, pt., et *Mœnides*, pt., Cuv.: *Percidœ*, pt., *Theraponidœ*, pt., *Hœmulonidœ*, pt., Richardson: *Percidœ*, pt., et *Pristipomatidœ*, pt., Günther, Catal., and *Percidœ*, Fische d. Sudsee: *Ambassoidei*, pt. Bleeker.

Branchiostegals from five to seven: pseudobranchiæ present. Form of body generally oblong, and not elongated. Muciferous system of head rudimentary, or but slightly developed. Eyes lateral. No superbranchial organ. Preopercle entire or serrated: cheeks not cuirassed. Mouth in front of snout, having a lateral cleft, occasionally on the lower side: moderately or in some cases very protractile. Teeth in the jaws villiform, with or without canines, present or absent on the vomer, and palatines. Anterior portion of the dorsal fin spinous: ventrals thoracic, 1/5 or sometimes 1/4. Scales ctenoid or cycloid. Lateral line when present continuous, (except in some species of Ambassis.) Air-vessel usually present and more or less simple. Pyloric appendages in varying numbers.

SYNOPSIS OF INDIAN GENERA.

First group—Percina.

Form of body oblong. Opercles strongly denticulated or armed. Cleft of mouth rather oblique. Two dorsal fins: three anal spines. Scales of moderate size, usually ctenoid. Pyloric appendages few.

1. *Lates.* Branchiostegals seven. Preorbital and opercle serrated, the latter denticulated at its angle. Villiform teeth on jaws, vomer, and palate.

Second group—Serranina.

Form of body oblong, sometimes elevated. Opercles serrated or armed. Cleft of mouth rather oblique. One, or more rarely two dorsal fins.

2. *Cromileptes.* Branchiostegals seven. Opercles armed. Fine teeth in jaws, vomer, and palate, without canines. A single elevated dorsal fin: three anal spines. Scales small, cycloid.

3. *Serranus.* Branchiostegals seven. Opercles armed. Villiform teeth in jaws, vomer, and palate: canines present. A single dorsal fin: three anal spines. Scales small, cycloid or ctenoid.

4. *Variola.* Branchiostegals seven. Opercles armed. Villiform teeth in jaws, vomer, and palate: canines present: lateral conical teeth in lower jaw. A single dorsal fin: three anal spines: caudal deeply forked. Scales small, ctenoid.

5. *Anthias.* Branchiostegals seven. Opercles armed. Villiform teeth in jaws, vomer, and palate: canines present. A single dorsal fin: three anal spines: caudal deeply forked. Scales of moderate size.

6. *Grammistes.* Branchiostegals seven. Opercle spinate. Villiform teeth in jaws, vomer, and palate. Two dorsal fins: no anal spines. Scales minute.

7. *Diploprion.* Branchiostegals seven. Opercle spinate: preopercle with a double denticulated limb. Villiform teeth in jaws, vomer, and palate. Two dorsal fins: anal with two spines. Scales small, adherent.

8. *Lutianus.* Branchiostegals seven. Opercle scarcely spinate: preopercle serrated, and its vertical border may be notched to receive an interopercular spinate knob, which is sometimes present. Villiform teeth in jaws, vomer, and palate, generally canines in both jaws, and an outer row of conical lateral ones. A single dorsal fin: anal with three spines. Caudal more or less emarginate. Ctenoid scales of moderate or small size.

Third group—Priacanthina.

Lower jaw prominent. Cleft of mouth almost vertical. Scales ctenoid, small. Cæcal pylori few.

9. *Priacanthus* as defined in group.

Fourth group—Apogonina.

Form of body more or less elevated and compressed. Opercles mostly denticulated or armed. Cleft of mouth oblique or even nearly vertical. One or two dorsal fins.

10. *Ambassis.* Branchiostegals six. Horizontal limb of preopercle with a double serrated border: opercle without a prominent spine. Villiform teeth on the jaws and palate. A recumbent spine anterior to the first dorsal fin: three anal spines. Scales of moderate or small size, deciduous.

11. *Apogon.* Branchiostegals seven. Preopercle with a double border: serrated or entire. Opercle spinate. Villiform teeth in jaws, vomer, and palate. Two anal spines. Scales large, deciduous.

12. *Cheilodipterus.* Branchiostegals seven. Preopercle with an inner ridge, and sometimes with a double serrature: opercle not spinate. Canines, also villiform teeth in the jaws and palatines. Two anal spines. Scales large, deciduous.

Fifth group—Grystina.

Body oblong or elevated. Opercles entire, or variously serrated. Cleft of mouth more or less oblique. One or two dorsal fins.

13. *Dules.* Branchiostegals six. Preopercle serrated: opercle spinate. Villiform teeth in jaws, vomer, and palate. A single dorsal fin, deeply notched between the ninth and tenth spines: three anal spines. Scales ctenoid and of moderate size.

Sixth group—Theraponina.

Branchiostegals six. Opercle spinate: preopercle serrated. Cleft of mouth somewhat oblique. Dorsal fin single, but more or less notched: three anal spines. Air-vessel divided by a constriction into an anterior and posterior portion.

14. *Therapon.* Teeth villiform in jaws, deciduous on vomer and palate.
15. *Datnia.* Teeth villiform in jaws, palate edentulous. Snout rather produced.
16. *Helotes.* Palate edentulous, teeth in the outer row in the jaws having a small lobe on either side.

Seventh group—Pristipomatina.

Branchiostegals from five to seven. Preopercle serrated or entire. Mouth moderately protractile. Teeth in the jaws. Three anal spines. Air-vessel destitute of any constriction.

17. *Pristipoma.* Branchiostegals seven. Opercle with indistinct points: preopercle serrated. Cleft of mouth horizontal: a median groove along the under surface of the lower jaw. Dorsal fin single, but often with a deep cleft between the last two spines.
18. *Hapalogenys.* Branchiostegals six or seven. Preopercle serrated: opercle with short points: barbel-like papillæ on the mandible. Villiform teeth in jaws, vomer, and palate, with an outer enlarged row in the former. Spinous dorsal low, and deeply cleft: anal with three spines. Fins covered with fine scales.
19. *Diagramma.* Branchiostegals six or seven. Preopercle serrated. Mouth small: lips thick: pores on the under surface of the lower jaw, but no median groove. A single dorsal fin.
20. *Lobotes.* Branchiostegals six. Upper profile of the head concave. Preopercle serrated. Lower jaw the longer. A single dorsal fin.
21. *Scolopsides.* Branchiostegals five. Preopercle serrated. A backwardly-directed spine on the infraorbital ring of bones: opercle with a weak spine. A single dorsal fin.
22. *Dentex.* Branchiostegals six. Preorbital high. Preopercle entire. Generally strong canines. More than three rows of scales on the preopercle. A single dorsal fin. Air-vessel notched posteriorly.
23. *Synagris.* Branchiostegals six. Preorbital high. Preopercle serrated, or entire. Canines, not very strong, at least in the upper jaw. Three rows of scales on the preopercle. A single dorsal fin.
24. *Pentapus.* Branchiostegals six. Preorbital low. Preopercle entire. Generally strong canines. Three or more rows of scales on preopercle. A single dorsal fin.
25. *Smaris.* Branchiostegals six. Preopercle entire. Vomer edentulous. Mouth protractile. A single dorsal fin.
26. *Odontonectes.* Branchiostegals six. Preopercle serrated. Villiform teeth in jaws, vomer, and palatines. A single dorsal fin.
27. *Cæsio.* Branchiostegals six or seven. Preopercle entire or finely serrated. Palate edentulous. A single dorsal fin.

Eighth group—Gerrina.

Branchiostegals six. Body elevated or oblong. Preopercle serrated or entire. Mouth very protractile. Villiform teeth in the jaws. A single dorsal fin: three anal spines. Air-vessel simple.

28. *Datnioides.* Preopercle serrated: opercle with short spines. A deeply notched dorsal fin: caudal rounded.
29. *Gerres.* Preopercle mostly entire. Inferior pharyngeal bones united by a suture. Dorsal fin with a scaly sheath. Caudal forked.

Geographical distribution. The Indian Percidæ are almost entirely marine fishes, if we are to judge from the localities where they breed, and the places in which they are most abundant. It is by no means uncommon to capture specimens of *Lates* long distances above tidal influence, but it is unusual to find any of the genera *Serranus, Lutianus, Therapon, Pristipoma, Lobotes, Datnioides,* or *Gerres*, many miles beyond the reach of the tides. The remainder of the genera (excluding *Ambassis)* are almost entirely marine. Amongst this last genus, which is considered by several excellent ichthyologists as forming a distinct family, some are confined to salt water, but the majority are spread through the larger rivers and tanks of the plains.

The colours and tints in fishes vary in different waters, if for instance the latter is opaque or muddy, its finny inhabitants will be found darker; whilst, on the other hand, in clear water they are brighter, and generally lighter.* Age and season likewise exercise an influence in this respect. Thus the *Lutianus marginatus* has a black lateral blotch in the young which generally, but not invariably, disappears in the adult; the same is seen in *Chætodon lunula, Etroplus Suratensis* and many other fishes. In some of the *Serrani*, and sometimes in

* Dr. Stark (Proc. Zool. Soc. 1833, p. 88) observed that the effect of keeping living fish in fresh water contained in vessels of different colours, created a tendency to their assuming the colour of the vessel in which they were kept. In marine forms it has been suggested that the depths of the ocean at which some reside may have an effect upon their colours.

Pristipoma, *Caranx*, *Osphromenus*, &c., vertical bands are found, as a sign that the fish is immature. Lateral longitudinal broad bands are frequently modified, two narrow ones taking the place of a single wider one, as seen in *Cheilodipterus*, *Diagramma*, &c. Likewise in stuffed examples, or in those which have been long macerated in spirit, marks which were distinct in the fresh specimen, become more or less obliterated. Irrespective of the foregoing, the period intervening between capture and examination, has a considerable bearing upon their fugitive colours, as well as whether they have been sodden in water, or kept dry by their captors: for instance, if a dark coloured fish is placed in a dry situation, and strips of moist cloth laid over it and kept wet, the portions of the body which have not been allowed to dry will be found to be of a lighter tint than those not so treated, and this banded appearance which can be so easily produced is indelible. It is by no means uncommon for the caudal fin to be white in the young, but black in the adult as in *Diagramma nigrum*.

The foregoing brief remarks on the colours of fishes will explain how it is that the descriptions in this work do not always agree with those of other observers. Such discrepancies indeed often merely mean, that the colours of the same species of fish may differ in different districts.

First group—Percina.

Form of body oblong. Opercles strongly denticulated or armed. Cleft of mouth rather oblique. Two dorsal fins: three anal spines. Scales of moderate size. Pyloric appendages few.

Genus, 1—Lates, *Cuv. and Val.*

Branchiostegals seven: pseudobranchiæ. Body oblong and somewhat compressed. Preorbital, and shoulder bone serrated: preopercle with strong spines at its angle, and denticulated along its horizontal limb: opercle spinate. Teeth villiform on jaws, vomer, and palatine bones, tongue smooth. Two dorsal fins united at their bases, the first with seven or eight spines, the anal with three: caudal rounded. Scales finely ctenoid, and of moderate size. Cæcal pylori few.

Geographical distribution. Mouths of the Nile: from the coasts of Sind throughout the seas of India to the Malay Archipelago, China, and Australia.

Uses. Besides being in most places excellent as food, their air-vessels or sounds are dried, and appear in commerce as rough isinglass, much of which is exported from India to China, and some to Europe. Cantor observes that this fish "yields isinglass in the Straits, but little is collected, partly on account of the comparative scarcity of the fish, and partly owing to the thinness of the air-vessel. That of a large sized fish when dried weighs upwards of one ounce."

SYNOPSIS OF INDIVIDUAL SPECIES.*

1. *Lates calcarifer* D 7—8/$\frac{1}{11-12}$, A. $\frac{3}{8-9}$, L. l. 60. Colour greyish. Seas of India, China, and Australia.

1. Lates calcarifer, Plate I, fig. 1.

Holocentrus calcarifer, Bloch, t. 244.
Perca calcar, Bl. Schn. p. 89.
Perca pandoomenoo, Russell, Fish. Vizag., ii, p. 23, f. 131.
Holocentrus heptadactylus, Lacép. iv, pp. 344, 391.
Coius vacti, Ham. Buch. Fish. Ganges, pp. 86, 369, pl. 16, f. 28.
Lates nobilis, Cuv. and Val. ii, p. 96, f. 13; Richardson, Ich. China, p. 222; Bleeker, Perc. p. 27; Cantor, Catal. Mal. Fish. p. 1; Hageman, Nat. Tyds. Ned. Ind. 1851, p. 348.
Lates calcarifer, Günther, Catal. Fish. i, p. 68 & P.Z.S. 1870, p. 824; Day, Fishes of Malabar, p. 2.
Plectropoma calcarifer, Bleeker, Atl. Ich. Perc. t. xlv, fig. 3.
Dangara, Sind.; *Nuddee-meen* or *Nair-meen*, Mal.; *Painnee-meen* or *Koduwa*, Tam.; *Pandu kopah* or *Pandu menu*, Tel.; *Durruah* and *Bekkut*, Ooriah; *Begti*, Beng.; *Nga-tha-dyk*, Arrac; *Koral*, or if large *Baor*, Chittagong; *Todah*, Andam.; *Cock-up* of Europeans.

B. vii, D. 7—8/$\frac{1}{11-12}$, P. 17, V. 1/5, A. $\frac{3}{8-9}$, C. 17, L. l. 52—60, L. tr. 6—7/13, Cæc. pyl. 3.

Length of head from 3/11 to 1/4, of caudal 1/5 to 1/6, height of body 3/10 to 3/11 of the total length. *Eyes*—diameter 1/5 to 1/6 of the length of the head, from 1 to 1¼ diameters from end of snout, and 3/4 of a diameter apart. In the immature the eye is comparatively larger. The maxilla extends to below the posterior edge of the orbit. Preorbital and preopercle finely serrated, the latter with an obtuse angle, having a large tooth directed backwards, and three smaller but strong denticulations along its lower edge: opercular spine weak. Shoulder bone serrated. *Teeth*—villiform on jaws, vomer, and palatines. *Fins*—dorsal spines strong, the third the highest, equalling about the length of the post-orbital portion of the head, from it they decrease: third anal spine longest and strongest, their proportionate lengths varying according to age, thus at four inches long the

* Although only one species of this Genus has been described from India, it will be necessary here to indicate the mode which will be pursued in this work as to the position of each individual in Genera which possess more than one. An excellent method is to begin with that form which is most typical: a second plan is to commence with those having the greatest affinity to the preceding Genus and finish with those closely allied to the following one, in which case the most typical forms are in the middle: the third and least scientific is what I propose adopting in order to facilitate reference, it is to place first those possessing the largest number of spines, rays and scales, and continuing this plan throughout the Genus. Colour will not be adopted for reasons advanced under the next Genus. (See page 9.)

second spine is 3/4 as long as the third, but at 20 inches it is not above 1/4 so long: pectoral shorter than ventral, and rounded: caudal fan-shaped. *Air vessel*—thin, but furnishes a good isinglass. *Colours*—grey, with a dash of green along the back, and silvery on the abdomen: during the monsoon time it has a tinge of purple. The immature are usually darker than the adults.

Having examined Bloch's typical specimen still at Berlin, I find that it has as he states D. $7/\frac{1}{10}$.

Deformities in this fish are by no means rare. In one case the last few dorsal rays were deflected to the left side of the free portion of the tail, and had there become continuous at their bases with the anal spines, which were likewise inserted along the same portion of the fish, whilst the anal rays were in their natural position.

It is very remarkable how in fishes which have died and stiffened with their mouths open, and the opercles and branchial rays distended, the appearance of the head becomes much changed, whilst it is difficult, or impossible to subsequently bring them back to their normal shape. Thus the profile of the head becomes more horizontal, whilst the posterior extremity of the maxilla does not reach so far back as when the mouth had been naturally closed.

Habitat.—Seas, backwaters, and mouths of tidal rivers in the East, up which last it often ascends long distances to prey upon its weaker neighbours. It is excellent eating when from the vicinity of large rivers. It salts well, and from it some of the best 'Tamarind-fish' is prepared.*

Second group—Serranina.†

Form of body oblong, sometimes elevated. Opercles serrated or armed. Cleft of mouth rather oblique. One, or more rarely two, dorsal fins.

Genus, 2—Cromileptes, *Swains.*

Serranichthys, Bleeker: *Lioperca*, Gill.

Branchiostegals seven: pseudobranchiæ. Body oblong, compressed. Eyes lateral, of moderate size. Preopercle with its vertical limb finely serrated, its horizontal one entire. Opercle with two or three spines. Teeth fine in the jaws, vomer, and palate, no canines: internal row in maxilla not fixed. Dorsal fin elevated, having ten or eleven spines, anal with three: caudal rounded. Scales small, cycloid.

SYNOPSIS OF INDIVIDUAL SPECIES.

I. *Cromileptes altivelis*, D. $\frac{10-11}{18-19}$, A. $\frac{3}{9-10}$, L. r. $\frac{100}{85}$. Upper profile of head concave. Covered with widely separated, black, white-edged spots. Seas of India to China and beyond.

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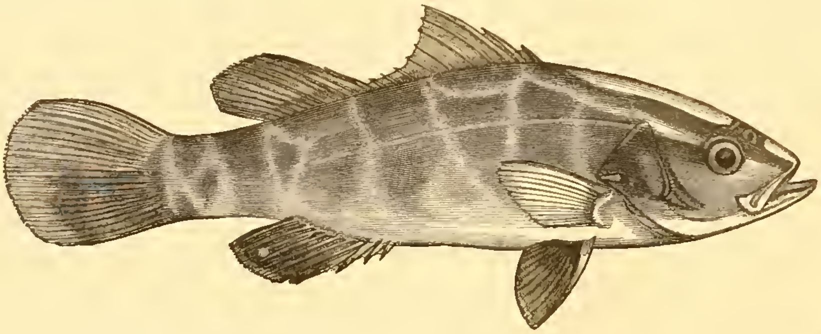


The above fish apparently belongs to the group *Percina* and may be a *Lates*. It is from a figure amongst the beautiful collection of coloured drawings made on the Coromandel coast of India by native artists, under the immediate supervision of Sir Walter Elliot, K.S.I. of the Madras Civil Service, who has most liberally placed the whole of them at my disposal for the purpose of this work. I have had it engraved in order to direct the attention of inquirers in India to it.

† Bleeker (Revis. des espèc. Ind-Arch. du groupe des Epinephelini, 1873) divides the Epinephelini (Serranini, pt.) as follows:—

I. Dorsal fin single or but slightly notched. Jaws and opercles scaled. Caudal fin with 15 divided rays.

A. Forehead, snout and suborbitals scaleless. Jaws with canines, which in the mandibles are both anterior and lateral.

1. *Paraserranus*, Blkr. Mandible scaleless. Inner row of teeth immoveable. Preopercle with a spine directed backwards. Dorsal with 10 spines; dorsal and anal scaleless. Scales of moderate size, ctenoid.

2. *Variola*, Swains.=*Pseudoserranus*, Klunz. Mandible scaleless. Inner row of teeth moveable. Preopercle feebly serrated, without any spine. Dorsal with 9 spines: dorsal and anal scaled. Scales very small, ctenoid.

3. *Paracanthistius*, Gill=*Plectropoma*, Gill (Cuv. and Val. ex. parte). Mandible scaled. Inner row of teeth moveable. Preopercle with its lower edge denticulated, the denticulations directed anteriorly. Dorsal with from 6 to 13 spines: dorsal and anal fins with scaly bases. Scales very small, ctenoid in the immature.

B. Forehead and lower jaw scaled. Inner row of teeth in the jaws moveable: mandibles without lateral canines. Dorsal and anal fins scaled. Scales small.

1. *Epinephelus*, Bloch=*Cephalopholis*, Bl. Schn.; *Labroperca, Mycteroperca, Bodianus, Enneacentrus, Petrometopon, Promicrops, Schistorus*, and *Menephorus*, Gill; *Prospinus*, Poey; *Priacanthichthys*, Day. Teeth on vomer, and palate: canines in the premaxillaries. Dorsal with 9 to 11 spines. Scales ctenoid or cycloid.

2. *Cromipeltes*, Swains.=*Serranichthys*, Blkr.; *Lioperca*, Gill. Teeth on vomer, and palate: no canines in the jaws. Dorsal with 10 or 11 spines. Profile anteriorly concave. Scales cycloid.

3. *Anyperodon*, Günther=*Cerna*, Bp.? Palate edentulous: no canines in the mandibles. Dorsal with 11 spines. Scales ctenoid.

1. Cromileptes altivelis, Plate I, fig. 2.

Serranus altivelis, Cuv. and Val. ii, p. 324, pl. 35; Richards. Ich. China, p. 230; Bleeker, Perc. p. 33; Cantor, Catal. p. 10; Günther, Catal. i, p. 152; Kner, Denks. Ak. Wiss. Wien. xxiv. t. i, f. 1.

Cromileptes altivelis, Swains. Fish. ii, p. 201; Bleeker, Atl. Ich. Perc. t. 44, f. 3 & Epinephelini, p. 26.

B. vii, D. $\frac{10-11}{18-19}$, P. 18, V. 1/5, A. $\frac{3}{9-10}$, C. 17, L. r. $\frac{100-120}{85-110}$, L. tr. 36/—.

Length of head 2/7, of caudal about 1/5, height of body 2/7 of the total length. *Eyes*—diameter from 1/5 to 2/11 of the length of head, rather above 1 diameter from the end of snout, and 3/4 of a diameter apart. Upper profile of head concave. Mouth elongated and pointed, with the lower jaw much the longer. The maxilla reaches to below the last third of the orbit. Vertical limb of preopercle serrated; its lower limb, also sub- and inter-opercles entire. Opercular spines not well developed. *Teeth*—villiform in the jaws, the outer row in the maxilla, and inner in mandibles rather larger than the rest. *Fins*—dorsal spines moderately strong, the last being slightly longer than those preceding it, but only 2/3 or 3/4 as high as the highest dorsal ray; soft portions of dorsal and anal fins angularly rounded, and much elevated: pectoral as long as the head: ventrals reach the anus: second anal spine stronger than but not quite so long as the third: caudal fan-shaped. *Scales*—cycloid, about 22 rows between the base of the sixth dorsal spine, and the lateral-line. *Colours*—head and body greyish becoming lighter on the abdomen: fins grey: everywhere covered with round, black, white-edged spots, those on the body, dorsal, and caudal fins being the largest. Bleeker observes that the magnitude, and number of the spots varies with the size of the specimen.

Habitat.—Seas of India to the Malay Archipelago and China. The specimen figured was taken at the Nicobars by the late Dr. Stoliczka. It is about 9 inches in length. Cuv. and Val. type skin has only 10 spines as in this case exists in my specimen.

Genus 3—Serranus,* *Cuv.*

Epinephelus, sp. Bloch: *Cephalopholis*, sp. Bl. Schn.: *Paraserranus* and *Serranichthys*, Blkr.: *Labroperca*, *Myeteroperca*, *Bodianus*, *Enneacentrus*, *Petrometopon*, *Promicrops*, *Schistorus*, and *Menephorus*, Gill: *Prospinus*, Poey: *Priacanthichthys*,† Day.

Branchiostegals seven: pseudobranchiæ. Eyes lateral, of moderate size. Preopercle with its vertical limb more or less serrated, its horizontal one generally entire, opercle with two or three flat spines. Teeth villiform in the jaws, vomer, and palate: canines present. Tongue smooth. Dorsal fin single, having from eight to twelve spines: anal with three: caudal cut square, obliquely, emarginate, or rounded. Scales small, ctenoid or cycloid. Pyloric appendages many, in moderate numbers, or few.

"Cavolini and Cuvier have, after repeated examinations, described the smooth Serranus *(S. cabrilla)*, and some other species of this genus as true hermaphrodites, one portion of each lobe of roe consisting of true ova, the other part having all the appearance of a perfect milt, and both advancing to maturity simultaneously. A structure of a different kind which must be considered as accidental, has been observed by others in the perch, mackerel, carp, cod, whiting, and sole. This occasional malformation, to speak in a popular phrase, consists of a lobe of hard female roe on one side, and of soft male roe on the other side of the same fish."‡

The colour of these fishes, which varies so extensively in the same species, can hardly be accepted as a trustworthy guide for grouping. The form of the preopercle is not invariably identical in every specimen of the same species, or even on the opposite sides of a fish: whilst a spine is occasionally present at its angle in the immature, becoming more or less absorbed in the adult. The sub- and inter-opercles may be serrated or smooth in the same species as observed in *Serranus boenack*. The fins also alter with age, owing to the spines not increasing in length so rapidly as the rays, consequently they may be comparatively shorter in the adult than in the young. Even the rays in the mature fish are found less in their proportionate height to the entire length of the specimen, than they are in the immature. The same thing occurs in respect to the anal spines, the second is sometimes the longest in the immature but becomes shorter than the third in the mature, and this appears to be most frequent when the second spine is the strongest, augmenting in thickness whilst the third increases in length. Occasionally there is an excess of one spine and a deficiency of a ray in the dorsal fin, the first of the rays having apparently taken on a spinous character, as is seen more distinctly in some of the Sparidæ. The numbers of rows of scales is very important amongst these fishes, as so ably pointed out by Bleeker, and many a mistake in identification would have been saved, had his plan been adopted, which is to give the numbers of transverse rows going to the lateral-line from both above and below. As an example I would point to the *Serranus Sonnerati*, so easily distinguished when this plan is followed, but apparently so difficult where it is not attended to.

Geographical distribution.—The seas of temperate and tropical regions. The members of this genus in India may be considered as entirely marine, a few, it is true, ascend rivers not for breeding but predaceous purposes, restricting their range, however, to within tidal influence.

* Fishes of this genus are termed *Cullawah*, Tam.

† In the Proc. Zool. Soc. 1868, p. 193, I described *Priacanthichthys Maderaspatensis* as the type of a new genus having a long serrated spine at the angle of the preopercle, and also a serrated ventral one, D. $\frac{11}{12}$, A. $\frac{3}{7}$, L. l. 70, L. r. above 100. Dark violet, with two light blue longitudinal bands. Dr. Günther suggests that it is the young of *Serranus latifasciatus*, Temm. & Schleg. which is by no means improbable, my largest specimen having been under two inches in length.

‡ Yarrell, British Fishes, i, p. 11.

Uses. Good as food, but coarse when very large. Isinglass is obtained from their air-vessels, but the amount is not very great.

SYNOPSIS OF SPECIES.

1. *Serranus Stoliczkæ*, D. $\frac{11}{19}$, A. $\frac{3}{7\text{-}8}$, L. r. $\frac{120}{100}$, L. tr. 14/40. Preopercle emarginate, and its vertical border serrated. Caudal rounded. Reddish, with four vertical bands on the body: head and anterior half of body spotted with red, or reddish yellow. Coasts of Sind and Aden.

2. *Serranus areolatus*, D. $\frac{11}{17\text{-}18}$, A. $\frac{3}{8}$, L. r. 105, L. tr. 19/47. Preopercle slightly emarginate: vertical limb serrated, having coarser teeth at its angle. Caudal emarginate. Reddish-brown, with hexagonal markings over the head, body, and fins, which latter have dark margins edged with white. From Aden throughout the seas of India to the Malay Archipelago.

3. *Serranus Waandersi*, D. $\frac{11}{17}$, A. $\frac{3}{8}$, L. r. $\frac{130}{120}$, L. tr. 25/56. Upper two thirds of body, dorsal fin, and upper third of caudal covered with hexagonal or rounded blotches. Seas of India to the Malay Archipelago.

4. *Serranus lineatus*, D. $\frac{11}{17\text{-}18}$, A. $\frac{3}{8\text{-}9}$, L. r. $\frac{135}{130}$, L. tr. 28/48. Cæc. pyl. above 50. Preopercle with several denticulations at the angle, rather well developed. Caudal rounded. Brown, with four, five, or more blue longitudinal bands. India and China, attaining at least four feet in length.

5. *Serranus merra*, D. $\frac{11}{16\text{-}17}$, A. $\frac{3}{8}$, L. r. $\frac{90}{82}$, L. tr. 16/32. Preopercle rounded, its vertical margin serrated, most coarsely at its angle. Pectoral fin as long as the head: caudal rounded. Reddish-brown everywhere covered with large brown spots.

6. *Serranus hexagonatus*, D. $\frac{11}{15\text{-}17}$, A. $\frac{3}{8}$, L. r. $\frac{110}{95}$, L. tr. 13/16. Cæc. pyl. 32. Preopercle with strongest serrations at the angle. Caudal rounded. Brown, covered with large hexagonal, or rounded spots. Red Sea, East coast of Africa, seas of India, Malay Archipelago to the Pacific.

7. *Serranus maculatus*, D. $\frac{11}{17}$, A. $\frac{3}{8}$, L. r. $\frac{106}{95}$, L. tr. 20/45. Preopercle rounded, vertical limb serrated, and most coarsely at its rather produced angle. Second, and third dorsal spines as long as the post-orbital portion of the head, and longer than the rays. Deep grey with round black spots on the head and some of the fins, becoming oval in the anterior half of the body, and rather sinuous on its posterior half. Coromandel coast of India, and the Andaman islands.

8. *Serranus flavo-cæruleus*, D. $\frac{11}{16\text{-}17}$, A. $\frac{3}{8}$, L. r. $\frac{120}{115}$, L. tr. 22/. Serrations on preopercle weak, strongest at its angle. Caudal slightly emarginate. Purplish-blue, tail and fins gamboge-yellow, ventral and anal with black tips. From the East coast of Africa throughout the seas of India.

9. *Serranus fasciatus*, D. $\frac{11}{16}$, A. $\frac{3}{8}$, L. r. $\frac{95}{92}$. Preopercle rather strongly serrated, most so at its angle. Caudal rounded. Reddish or yellowish with indistinct vertical bands: dorsal, and caudal fins may be black edged. From the Red Sea, through those of India to the Malay Archipelago and beyond.

10. *Serranus tumilabris*, D. $\frac{11}{16}$, A. $\frac{3}{8}$, L. r. $\frac{95}{85}$, L. tr. 21/. Preopercle serrated. Caudal rounded. Greyish-olive, darkest along the back. Body, and head covered with irregularly-sized pearly-white spots, whilst a black line exists on the maxilla. Fins dark grey, externally nearly black; the margins of the pectoral, ventral, soft dorsal, and caudal have a very narrow white border. The whole of the dorsal fin with white spots, as on the body. East coast of Africa, seas of India, and Burma, to the Malay Archipelago.

11. *Serranus diacanthus*, D. $\frac{11\text{-}12}{15\text{-}16}$, A. $\frac{3}{8\text{-}9}$, L. r. $\frac{100}{95}$, L. tr. 20/45. Cæc. pyl. 11. Preopercle with strong teeth at its angle. Pinkish-brown on the back, rose coloured on the abdomen. Six vertical dark bands, the first on the head. Fins with dark margins. Found throughout the seas of India to Java. Is very common in Sind, and specimens reach 18 inches or more in length.

12. *Serranus sexfasciatus*, D. $\frac{11}{15}$, A. $\frac{3}{8}$. Two spinate teeth at the angle of the preopercle. Brownish, with six vertical bands, and some irregular spots on the body. Dorsal, caudal, and anal yellow with black spots. Seas of India to the Malay Archipelago.

13. *Serranus lanceolatus*, D. $\frac{11}{15\text{-}16}$, A. $\frac{3}{8}$, L. r. $\frac{110}{70}$, L. tr. 20/52. Cæcal pylori numerous, but very short. When young it is gamboge yellow, with five blackish-blue cross bands. Fins yellow with black bands, and spots. As it becomes adult the bands become broken up into irregular markings, and the yellow colour disappears, except from the fins, in which the black becomes also broken up into black spots. East coast of Africa, seas of India to the Malay Archipelago. Very numerous at Kurrachee: it attains a large size.

14. *Serranus erythrurus*, D. $\frac{11}{16}$, A. $\frac{3}{9}$. Preopercular border rounded, and finely serrated in its vertical portion. Fins rounded. Head, and back greenish shot with red; under surface of the body silvery. Dorsal greenish; pectorals, ventrals, and anal yellowish; tail, and free portion of caudal reddish. Specimen 8 inches in length, but said to attain 4 feet. Malabar.

15. *Serranus Malabaricus*, D. $\frac{11}{15\text{-}17}$, A. $\frac{3}{8}$, L. r. $\frac{105}{95}$, L. tr. 19/50. Cæc. pyl. 50-60. Vertical limb of preopercle serrated, strongest at the angle. Fins rounded. Brownish, with about eight cross bands, the first over the head, the second over the nape. Head, and body covered with large round yellow spots, that usually become brown in dead specimens; yellow spots also on the dorsal fin, which sometimes coalesce and form bands. East coast of Africa, seas of India to the Philippines. It attains a very large size.

16. *Serranus corallicola*, D. $\frac{11}{15\text{-}16}$, A. $\frac{3}{9}$, L. r. $\frac{95}{90}$. Greyish-brown with black spots. Madras to the Malay Archipelago.

17. *Serranus salmoides*, D. $\frac{11}{15\text{-}16}$, A. $\frac{3}{8}$, L. r. $\frac{105}{90}$, L. tr. 24/50. Vertical limb of preopercle serrated, with three or four coarse teeth at the angle. Fins rounded. Brownish yellow: body, and fins entirely covered with black, or yellow spots. From the Red Sea, through the seas of India, to the Malay Archipelago.

18. *Serranus semipunctatus*, D. $\frac{11}{16}$, A. $\frac{3}{8}$. The serrations on the preopercle are fine. Caudal rounded. Body with six, or seven broad cross bands; head, and fins only are spotted. Pondicherry, to 1 foot in length.

19. *Serranus summana*, D. $\frac{11}{15-16}$, A. $\frac{3}{8}$. Canine teeth small. Preopercle serrated, with a shallow notch above its angle. Second anal spine longest and strongest: caudal rounded. Brown, body, and vertical fins covered with small, round, white dots. Scarcely any spots on the head: a black streak above the maxilla. Red Sea, East coast of Africa, and Andaman Islands, where it is very common.

20. *Serranus dermochirus*, D. $\frac{11}{16}$, A. $\frac{3}{8}$, appears to be a variety of the last species. Malabar.

21. *Serranus morrhua*, D. $\frac{11}{15}$, A. $\frac{3}{8}$, L. r. $\frac{130}{115}$, L. tr. 21/46. Preopercle with three strong teeth at its angle. Caudal rounded. Greenish-olive, becoming dull yellow on the abdomen; several irregular bluish-white bands radiate from the orbit, or exist on the head, whilst others are seen on the body. Red Sea, seas of India to Japan.

22. *Serranus angularis*, D. $\frac{11}{15-16}$, A. $\frac{3}{8}$, Cæc. pyl. 13-14. Three strong denticulations at the angle of preopercle. Caudal lunate. Greyish, head and body, covered with large closely-set yellow spots. Fins spotted, all, except the pectoral, with black white-edged margins. Andamans.

23. *Serranus fuscoguttatus*, D. $\frac{11}{14-15}$, A. $\frac{3}{8}$, L. r. $\frac{100}{90}$, L. tr. 22/56. Canine teeth feeble in the upper and not apparent in the lower jaw. Vertical limb of preopercle rather strongly serrated, but more coarsely at its angle: third anal spine longest, but not so strong as the second: caudal rounded. Greyish, with brown spots of a larger or smaller size irregularly disposed. East coast of Africa: Andaman Islands.

24. *Serranus grammicus*, D. $\frac{11}{12}$, A. $\frac{3}{8}$, L. r. $\frac{105}{106}$, L. tr. 17/44. Preopercle serrated, more coarsely at its angle. Caudal fin cut nearly square. Greyish, with three narrow black bands; the superior passes from the upper edge of the orbit to the last dorsal spine; the second from the upper third of the orbit over the superior opercular spine to the base of the sixth dorsal ray; and the third from the lower edge of the orbit to below the middle opercular spine, and on to the upper third of the caudal fin, where it takes the form of rounded blotches. Dorsal fin with a row of black spots along its centre, and edged with black; anal, and caudal edged with black, the latter with numerous black spots. Madras, to at least 15 inches in length.

25. *Serranus boenack*, D. $\frac{9}{16-18}$, A. $\frac{3}{8-9}$, L. r. 95, L. tr. 22/43. Preopercle most coarsely serrated at its angle. Caudal rounded. Yellowish-brown: snout pale blue: lips, and throat spotted with a darker blue: and about five fillets of the same colour diverge from the orbit and cross the opercles. Tortuous blue lines along the body. Seas of India to the Malay Archipelago, and China.

26. *Serranus miniatus*, D. $\frac{9}{15-16}$, A. $\frac{3}{9-10}$, L. r. $\frac{106}{96}$, L. tr. 14/40, Cæc. pyl. 12 (Madras) to 16 (Andamans). Sub- and inter-opercles serrated, as is also the vertical limb of the preopercle: opercle, with three spines, the upper the shortest. Caudal rounded. Scarlet: body, cheeks, dorsal, caudal, and anal fins covered with large blue spots. Two dark streaks from the orbit along the snout: fins darkest at their outer edges. Two rows of large blue spots along the hard dorsal, and six or eight over the soft, and the anal. Madras, Andamans, to the Malay Archipelago.

27. *Serranus guttatus*, D. $\frac{9}{15-16}$, A. $\frac{3}{8-9}$, L. r. $\frac{107}{102}$, L. tr. 21/43, Cæc. pyl. 8. Preopercle not emarginate: edge very slightly if at all serrated. Brownish-black, head, body, and all the fins with round blue black-edged spots, caudal, anal, and the posterior half of the dorsal with a white edge. Red Sea, seas of India to the Malay Archipelago, China, and Australia.

28. *Serranus leopardus*, D. $\frac{9}{13-15}$, A. $\frac{3}{8-9}$, L. r. $\frac{88}{80}$, L. tr. 10/26. Reddish or yellowish: body spotted: a dark band from the eye to the opercle: one or two more over the free portion of the tail, and an oblique black band across either caudal lobe. Red Sea, through the seas of India to China.

29. *Serranus Sonnerati*, D. $\frac{9}{15}$, A. $\frac{3}{9}$, L. r. $\frac{130}{116}$, L. tr. 27/40, Cæc. pyl. 11 or 12. Vertical limb of preopercle finely serrated: caudal rounded. A dull lake colour, the head, and jaws covered with reticulated bright blue lines. Some very indistinct spots over the whole of the body. Fins lake colour, darkest at the edges. Soft dorsal, anal, and caudal sometimes with lightish badly-marked spots. East coast of Africa, seas of India to Sumatra, and the Louisiade Archipelago.

30. *Serranus Boelang*, D. $\frac{9}{16}$, A. $\frac{3}{8-9}$, L. r. $\frac{90}{83}$, L. tr. 18/36. Preopercle rounded, and its vertical border finely serrated. Purplish, with eight or nine vertical bands on the body. East coast of Africa, Andamans to the Malay Archipelago.

1. **Serranus Stoliczkæ**, Plate I, fig. 3.

B. vii, D. $\frac{11}{19}$, P. 17, V. 1/5, A. $\frac{3}{7-8}$, C. 17, L. r. $\frac{120}{100}$, L. tr. 14/40.

Length of head, 3/11 to 2/7, of caudal 2/11 to 1/6, height of body 2/7 to 1/4 of the total length. *Eyes*—diameter 1/4 to 2/9 of length of head, 1 diameter from end of snout and also apart. The maxilla extends to below the posterior 1/3 or hind edge of the eye. Vertical border of the preopercle emarginate, rather coarsely serrated most so at its angle, its lower limb, sub- and inter-opercles entire. *Teeth*—canines in both jaws, the outer row in the maxilla and the inner in the mandible larger than the villiform bands. *Fins*—dorsal spines, excluding the two first, of about equal length, and from two-fifths to half the height of the body: pectoral as long as the head behind the middle of the orbit, and much longer than the ventral which reaches the vent: second anal spine strongest, the third somewhat the longest, equalling the third of the dorsal fin: caudal rounded. *Scales*—cycloid, extended over snout, suborbitals and hind half of maxilla. *Colours*—light brownish-red, becoming hyacinth-red on the sides and below, barred with four vertical darker bands, the anterior proceeding from the whole base of the spinous dorsal, these bands become indistinct in large specimens.

Head, and body, as far as the base of the soft dorsal, and anal, spotted with reddish-orange or gall-stone yellow, which on the head, and sometimes as far as the base of the pectoral fin, are in hexagonal blotches, divided by light lines. Base of pectoral white having a black crescentic band. Under surface of the throat and chest with large black marks sometimes enclosing lighter spaces. Dorsal fin with chestnut-brown spots: some white ones on the caudal, and anal.

I have dedicated this fish to the memory of my friend, and fellow worker in zoology, Dr. Ferdinand Stoliczka, whose untimely death, due to excess of zeal in the cause of Natural History, is referred to in the preface.

Habitat.—Coast of Sind, very common at Aden: it attains at least 12 inches in length, the specimen figured is 6 inches long.

2. **Serranus areolatus**, Plate I, fig. 4.

Perca areolata, Forsk. p. 42.

Perca tauvina, Geoff. Descr. de l'Eg. pl. 20, fig. 1.

Serranus tauvinus, Geoff. Poiss. d'Eg. p. 201.

Serranus areolatus (Japonicus), Temm. Schleg. Fauna Japon. p. 8; Cuv. and Val. ii, p. 350; Richards., Ich. China, p. 232; Peters, Wieg. Arch. 1855, p. 235; Günther, Catal. i, p. 149; Klunzinger, Verh. z. b. Ges. Wien, 1870, p. 675.

Serranus chlorostigma, Cuv. and Val. ii, p. 352; Günther, Catal. i, p. 151.

B. vii, D. $\frac{11}{17-18}$, P. 15, 1/5, A. $\frac{3}{8}$, C. 19, L. r. 105, L. tr. 19/47.

Length of head 3/10 to 2/7, of caudal 1/6, height of body 1/4 of the total length. *Eyes*—diameter 1/5 to 1/6 of length of head, $1\frac{1}{2}$ diameters from the end of snout and 1 apart. Lower jaw the longer: the maxilla reaches to below the posterior edge of the orbit. Vertical limb of preopercle oblique, serrated, and with much coarser teeth at its somewhat produced angle: sub- and inter-opercles entire. Central opercular spine the most developed. *Teeth*—small canines in both jaws, the outer row in the maxilla, and the inner in the mandible, rather larger than the villiform bands. *Fins*—the third to the fifth dorsal spines the longest, and equal to the highest rays: pectoral as long as the head behind the middle of the eyes: third anal spine $1\frac{1}{3}$ diameters of the orbit in length, not quite so strong, but longer than the second: caudal emarginate: in some specimens the outer rays are slightly produced, and the intermediate portion of the fin is cut square. *Scales*—slightly ctenoid. *Colours*—reddish-brown, with hexagonal markings, formed by fine bluish-white lines, which exist over the head, body, and fins, the last have dark margins edged with white. In Madras and Andaman specimens, the markings on the fins are not always so distinct, whilst there is generally a white upper half to the last third of the caudal fin. Sometimes the pectorals are of an uniform yellow and not marked.

The *S. chlorostigma* appears to be this species, with slightly stronger teeth at the angle of its preopercle than seen in typical *S. areolatus*, the markings are the same but lighter.

Habitat.—Coasts of India, from the Red Sea to the Malay Archipelago, attaining a considerable size. Largest specimen obtained 21 inches in length, the one figured is 9 inches.

3. **Serranus Waandersi**, Plate VIII, fig. 1.

Epinephelus Waandersi, Bleeker, Atl. Ich. Perc. t. xi, f. 3, and Epinephelini, p. 68.

B. vii, D. $\frac{11}{17}$, P. 18, V. 1/5, A. $\frac{3}{8}$, C. 17, L. r. $\frac{120-130}{110-120}$. L. tr. 25/56.

Length of head 3/11, of caudal nearly 1/6, height of body 4/15 to 1/4 of the total length. *Eyes*—diameter 2/9 (in a specimen 10 inches long) to 2/11 (in a specimen 20 inches long) of length of head, $1\frac{1}{3}$ diameters from end of snout, and from 2/3 to nearly 1 apart. The posterior extremity of the maxilla reaches to below the middle of the orbit. Vertical limb of the preopercle rather strongly serrated, more especially at its angle, which is not produced, its lower limb, as well as sub- and inter-opercles entire: three distinct opercular spines, the central one being the most developed. *Teeth*—villiform, with an outer enlarged row in the upper and an inner in the lower jaw: small canines in both jaws: a narrow band along the centre of the tongue. *Fins*—dorsal spines of moderate length, increasing to the fourth which equals from 2/5 in the young to 1/3 in the height of the body below it, rays rather higher than the spines, soft portion of the fin and also of the anal rounded: pectoral longer than the ventral, and equalling the head behind the middle of the eye: anal spines rather strong, the third the longest, and equal to four-fifths that of the highest in the dorsal fin: caudal cut square in the young, but slightly emarginate in the adult, owing to the prolongation of the outer rays. *Scales*—rather strongly ctenoid, and thickly covering the snout, and suborbital ring of bones, as well as the posterior half of the maxilla. *Colours*—dark purplish, lightest on the abdomen, the whole of the head and body as low as the pectoral fin, the dorsal and upper third of the caudal, covered with large closely approximating rather dark edged blotches of yellow, which are rounded or hexagonal, those on the head being the smallest. Fins a little darker than the body, and stained with black at their edges: dorsal with a white margin: pectoral orange, upper half of caudal lighter than the lower (Male).

I first observed this species in the Madras Museum in 1867, where it was labelled *S. salmonoides*. I find it amongst Sir Walter Elliot's drawings. Jerdon (Madr. J. L. and Sc. 1851, p. 129) remarks under the head of *S. suillus*, "In one specimen, of which I possess a drawing, only the upper half of the caudal is spotted."

Habitat.—Seas of India to the Malay Archipelago, attaining at least 2 feet in length, the specimen figured is 10 inches long.

4. Serranus undulosus, Plate II, fig. 1.

Bodianus undulosus, Quoy and Gaim. Voy. Freycinet, Poiss. p. 310 (not *Serranus undulosus*, Cuv. and Val.).

Serranus lineatus, Cuv. and Val. ii, p. 312; Jerdon, M. J. L. and Sc. 1851, p. 129; Günther, Catal. i, p. 156.

Serranus Amboinensis, Bleeker, Amb. and Ceram. p. 258; Günther, Catal. i, p. 156.

Epinephelus undulosus, Bleeker, Epinephelini, p. 65, and Atl. Ich. t. 228, Perc. t. 10, f. 3.

B. vii, D. $\frac{11}{17\text{-}19}$, P. 19, V. 1/5, A. $\frac{3}{8\text{-}9}$, C. 17, L. l. ca. 90, L. r. $\frac{135}{130}$, L. tr. 20/48, Cæc. pyl. above 50.

Length of head from 2/7 to 3/11, of caudal 1/6, height of body 3/11 of the total length. *Eyes*—diameter 1/4 to 1/5 of length of head, from 1 to $1\frac{1}{4}$ diameters from the end of snout, and from 1/2 to 3/4 of a diameter apart. The maxilla reaches to below the last third or even the hind edge of the orbit. Preopercle serrated along its vertical edge, and with from two to four strong denticulations at its angle which is rather produced, especially in the adult: sub- and inter-opercles entire. Opercular spines distinct, the central one the most developed. In the fry a distinct spine exists at the angle of the preopercle. *Teeth*—one or two rather small canines on both sides of the symphysis in either jaw, those in the upper the larger: outer row of teeth in maxilla, and inner in the mandible larger than the villiform bands. *Fins*—dorsal spines of moderate strength, the third to the fifth the longest, equal to the distance between the hind edge of the orbit and the upper opercular spine, and nearly as high as the rays: pectoral and ventral of about the same size, and equal to the postorbital length of the head: second anal spine the strongest and nearly as long as the third, which equals one and a third diameters of the orbit in length. Soft portions of dorsal and anal fins somewhat rounded: caudal cut square in the adult, but rather rounded in the young. *Scales*—ctenoid. *Colours*—reddish-grey, becoming lighter on the abdomen: numerous oblique narrow brown (blue?) bands of varying length, and usually somewhat sinuous above the lateral-line not following the course of the scales, whilst they are more or less horizontal below it: dots and yellow lines on the head: fins rather dark, and stained at their edges.

I place this species as *S. undulosus*, in accordance with Bleeker's observations. There is no doubt but that it is identical with *S. lineatus* C.V., the type specimen of which (a skin) exists in Paris.

Amongst Sir Walter Elliot's drawings is one of this fish, termed *Seela panni*, October, 1848.

Habitat.—Seas of India to the Malay Archipelago and China. It is not uncommon at Madras where the young are numerous during the cold season. The longest specimen obtained was 12 inches.

5. Serranus merra, Plate II, fig. 2.

? Perca tauvina, Forsk. p. 39; Gmel. Linn. p. 1316.

Epinephelus merra, Bloch, t. 329; Bl. Schn. p. 300 (not Bleeker).

? Holocentrus tauvina, Bl. Schn. p. 321.

Serranus Gilberti, Richardson, Ann. Nat. Hist. 1842, p. 19, and Ich. China, p. 230; Günther, Catal. i, p. 148.

Serranus megachir, Richards. Ich. China, p. 230.

Serranus pardalis, Bleeker, Perc. p. 37.

Serranus Quoyanus, Günther, Catal. i, p. 153; (? Cuv. and Val. vi, p. 519).

Epinephelus pardalis, Bleeker, Ternate, p. 232.

Serranus tauvina, Klunz. Fisch. d. Roth. Meer. Verh. z. b. Ges. Wien, 1870, p. 683.

Epinephelus Gilberti, Bleeker, Epinephelini, p. 91.

B. vii, D. $\frac{11}{16\text{-}17}$, P. 18, V. 1/5, A. $\frac{3}{8\text{-}9}$, C. 17, L. r. $\frac{90}{82}$, L. tr. 16/32.

Length of head 2/7 to 3/11, of caudal 2/9, height of body 3/11 to 1/4 of the total length. *Eyes*—diameter 1/4 to 2/9 of the total length, 3/4 of a diameter from the end of snout, and also apart. Snout obtuse. The maxilla reaches to below the hind edge of the orbit. Preopercle rounded, its vertical border coarsely but evenly serrated, its lower edge and also the sub- and inter-opercles entire. Central opercular spine well developed. *Teeth*—small canines in both jaws, the outer row of teeth in maxilla, and inner in mandible, slightly larger than the villiform bands. *Fins*—dorsal spines rather strong, the fourth somewhat the highest, equalling two-fifths of the length of the head, but not so long as the rays, from it they decrease to the last: soft portion of dorsal, and anal fins somewhat angularly rounded: pectoral large, as long as the head, and longer than the ventral: second anal spine strongest, and about as long as the third which slightly exceeds the second of the dorsal fin: caudal fan-shaped. *Scales*—ctenoid. *Colours*—reddish-brown, covered with large brown spots, except on the pectoral fin, on the head they appear to be usually somewhat hexagonal, with a light intervening reticulation: the marks on the body are larger, and also are usually hexagonal: pectoral with a dark semilunar mark over its base divided by a light band from the dark grey of the rest of the fin, which, as well as the ventral, and anal, has a black margin. A fine specimen in the Berlin Museum has a light edge to the pectoral fin.

Bloch's type specimen of *Epinephelus merra* (pl. 329) is $8\frac{1}{2}$ inches in length, and still in Berlin amongst his fishes.

S. Quoyanus, apud Günther has its scales thus: L. r. $\frac{90}{82}$, L. tr. 16/, and appears to me to be closely allied if not identical with *S. merra*, whilst it does not disagree with Valenciennes diagnosis, whose type specimen, however, I have not examined.

Habitat.—Red Sea, seas of India to the Malay Archipelago and China. The specimen figured is $8\frac{2}{10}$ inches long, and was captured at the Andaman Islands.

6. Serranus hexagonatus, Plate II, fig. 3.

Perca hexagonata, Forster, Desc. An. p. 189.
Holocentrus hexagonatus, Bl. Schn. p. 323.
Holocentrus merra, Lacép. pp. 342, 384.
Serranus merra et *faveatus*, Cuv. & Val. ii, pp. 325, 329.
Serranus hexagonatus, Cuv. & Val. ii, p. 330; Guérin, Icon. Poiss. pl. 4, fig. 1; Richards. Voyage Sulphur, p. 82, pl. 38, fig. 1; Cantor. Catal. p. 7; Bleeker, Nat. T. Ned. Ind. vi, p. 191; Peters, Monat. Ak. Wiss. 1865: Günther, Catal. i, p. 141 & Fische d. Sudsee, p. 7, t. vii; Kner, Novara Fische, p. 25; Klunz. Fische d. Roth. Meer. Verh. z. b. Ges. Wien. 1870, p. 683.
Serranus confertus, Benn. Life Raffles, Fish. Sumatra, p. 686.
Serranus nigriceps, Cuv. & Val. vi, p. 517.
Epinephelus hexagonatus, Bleeker, Atl. Ich. Perc. t. 23. fig. 2.
Epinephelus merra, Bleeker, Epinephelini, p. 88 (not Bloch).
Naambu, Bel.: *Pulli-cullawah*, 'Spotted Perch' Tam.
B. vii, D. $\frac{11}{15-17}$, P. 16, V. 1/5, A. $\frac{3}{8}$, C. 17, L. r. $\frac{110}{95}$, L. tr. 13/36, Cæc. pyl. 32, (24 Kner).

Length of head from 3/10 to 2/7, of caudal 1/6, height of body 2/7 to 1/4 of the total length. *Eyes*—diameter 1/4 to 2/9 of the length of head, 1 to $1\frac{1}{4}$ diameters from the end of snout, and from 1/3 to 1 apart. The maxilla reaches to below the hind edge of the orbit. Vertical limb of preopercle finely serrated in its upper two-thirds, more coarsely so in its lower third, especially at its angle, which, though usually rounded, is sometimes slightly produced and armed with one or two strong teeth, its lower limb and also the sub- and interopercles entire: the central opercular spine the most developed. *Teeth*—canines in the upper jaw stronger than those in the lower, the outer row of teeth in the maxilla and the inner in the mandibles stronger than the villiform bands. *Fins*—dorsal spines of moderate strength, the fourth the longest, from whence they slightly decrease to the last, which is not so high as the first ray: soft portion of the dorsal and anal fins angularly rounded: pectoral a little longer than the ventral and equal to the length of the head behind the middle of the eye: second anal spine strongest and slightly the longest: caudal obtusely rounded. *Scales*—ctenoid. *Colours*—reddish brown with a light reticulation causing the body, and also the pectoral, soft dorsal, and caudal fins to be covered with hexagonal, or sometimes rounded markings. In some specimens the dark blotches become more confluent, the light reticulations being indistinct.

Although Bloch's figure (t. 329) more resembles *S. hexagonatus* than the species under which I here place it, my reason for doing so is that Professor Peters has shown me the type specimen which unquestionably belongs to this species.

Serranus cylindricus, Günther, Catal. i, p. 151, in some respects very closely resembles this species, its scales are L. r. $\frac{110}{95}$, L. tr. 13/, the diameter of its eye $4\frac{2}{3}$ in the length of the head, and 1 diameter from the end of the snout. Although the body is more elongated, it is wider than normal. I almost think that it will turn out to be a variety of this species.

In Cuv. & Val. it is suggested that *Trachinus Adscensionis*, Osbeck, ii, p. 96 belongs to this species, he observes "the *body* is somewhat compressed and not quite round."

Habitat.—Red Sea, East coast of Africa, seas of India, Malay Archipelago to the Pacific. The specimen figured was taken at the Andaman Islands and is a little over 8 inches in length.

7. Serranus maculatus, Plate II, fig. 4.

Holocentrus maculatus, Bl. t. 242, fig. 3 (young); Bl. Schn. p. 315.
Holocentrus albofuscus, Lacép. iv, p. 384.
Serranus Gaimardi, Cuv. & Val. vi, p. 520; Quoy & Gaim. Voy. Astrol. Poiss. p. 656, pl. 3, fig. 3; Bleeker, Batav. p. 455; Günther, Catal. i, p. 150; Playfair, Proc. Zool. Soc. 1867, p. 847.
Serranus Sebæ, Bleeker, Amb. p. 488; Günther, Catal. i, p. 137.
Serranus maculatus, Bleeker, Boeroe, p. 398.
Serranus albofuscus, Günther, Catal. i, p. 108.
Serranus longispinis, Kner, Voy. Novara, Poiss. p. 27, t. ii, f. 2: Playfair, Fish. Zanz. p. 10.
Epinephelus Gaimardi, Bleeker, Atl. Ich. Perc. vii, fig. 1.
Epinephelus albofuscus, Bleeker, l. c. Perc. xxvi, fig. 2.
Epinephelus maculatus, Bleeker, Epinephelini, p. 75, Atl. Ich. Perc. t. viii, fig. 3, & xi, fig. 2.
B. vii, D. $\frac{11}{17-18}$, P. 18, V. 1/5, A. $\frac{3}{8}$, C. 17, L. r. $\frac{106}{95}$, L. tr. 20/45.

Length of head 3/10 to 2/7, of caudal 1/6, height of body nearly 1/4 of the total length. *Eyes*—diameter from 2/9 to 1/5 of the length of head, rather above 1 diameter from the end of snout, and 1 apart. The maxilla, which is rather wide posteriorly, reaches (in the young) to below the last third of the orbit, and in the adult to beneath its hind edge. Preopercle rounded, with its vertical border strongly but pretty evenly serrated, whilst its angle is a little produced and has about eight coarse denticulations. Opercle with the central spine well developed. *Teeth*—small canines in either jaw: the outer row in the maxilla, and the inner in the mandible larger than the villiform bands. *Fins*—dorsal spines of moderate strength: they increase to the third, which equals half the length of the head, and is one half longer than the rays: from thence they decrease, but the last is nearly as long as the rays; the soft portions of the dorsal and anal are somewhat angular: pectorals longer than the ventrals and equal to the length of the head from behind the middle of the orbit: second anal spine strongest but not so long as the third, which is nearly one third of the length of the head: caudal cut square but with

rounded angles. *Scales*—ctenoid. *Colours*—deep grey, with round black spots somewhat distantly placed on the head, pectoral, and ventral fins: oval spots, having their longest diameter vertical, exist in the anterior half of the body, becoming more like short thick sinuous lines on the last half. A black edge along the top of the spinous dorsal, and some cloudy interspinous marks: the soft dorsal, anal, and caudal with a black edge and white margin.

Bleeker, in his excellent revision of the Epinephelini, observes that he possesses a beautiful series of specimens of this species showing the successive transitions in colour, which certainly varies very considerably. The young *(maculatus)*, according to Bloch's figure, appears to have a light ground colour with a dark band over the head: a second, from the second to the fifth dorsal spine, passing downwards, encloses the pectoral, and ventral fins: a third from the soft dorsal passes down to the whole of the anal: one more exists over the free portion of the tail, and two on the caudal fin; a dark horizontal band appears to connect the others along the middle of the body.

The specimen figured (7 inches in length) from the Andaman Islands agrees with Kner's *S. longispinis*. The type specimens of *S. Gaimardi* in the Paris Museum have a much higher body comparatively, whilst the longest dorsal spine scarcely exceeds the length of the rays.

Habitat.—East coast of Africa, seas of India, Andamans to the Malay Archipelago, and China.

8. **Serranus flavo-cæruleus**, Plate III, fig. 1.

Holocentrus flavo-cæruleus, Lacép. iv, pp. 331, 367.
Holocentrus gymnosus, Lacép. iii, pl. 27, fig. 2, and iv, pp. 335, 372.
Bodianus macrocephalus, Lacép. iii, pl. xx, f. 2, and iv, pp. 281, 293, 295.
Perca flava-purpurea, Benn. Fish. Ceylon, p. 19, pl. 19.
Serranus Borbonicus, Quoy and Gaim. Voy. Uranie, Poiss. p. 313, pl. 57, f. 2.
Serranus flavo-cæruleus, Cuv. and Val. ii, p. 297; Peters, Wieg. Arch. 1855, p. 236; Günther, Catal. i, p. 145.
Cynichthys flavo-purpuratus, Swains. Fish. ii, p. 202, f. 42, c. (head).
Epinephelus flavo-cæruleus, Bleeker, Fish. Madagascar, p. 17.
Mungil cullawah, Tam.: *Kuha-laweyah*, Cingalese.

B. vii, D. $\frac{11}{16-17}$, P. 17, V. 1/5, A. $\frac{3}{7-8}$, C. 17, L. r. $\frac{120}{115}$, L. tr. 22/—.

Length of head 3/10, of caudal about 1/5, height of body 3/10 of the total length. *Eyes*—diameter 2/9 to 2/11 of the length of head, $1\frac{1}{2}$ diameters from the end of snout and 1 apart. The maxilla reaches to below the hind edge of the orbit. Preopercle with its vertical limb finely serrated, more coarsely so at its angle, where occasionally they are almost spinate:* lower limb, sub- and inter-opercles entire. Central opercular spine rather strong. *Teeth*—small canines in either jaw, the outer row in the maxilla and the inner in the mandible, larger than the villiform bands. *Fins*—dorsal spines rather strong, increasing in length to the third which equals about 3/8 of the height of the body, and is rather longer than the soft portion of the fin which, as well as that of the anal, is rounded: pectoral as long as the head behind the middle of the eye: ventral reaches three-fourths of the distance to the vent: second anal spine not quite so long as the third: caudal emarginate. *Scales*—ctenoid on the body, thickly covering the snout, pre- and sub-orbitals, likewise the posterior half of the maxilla: about 18 rows between the lateral-line and the sixth dorsal spine: those on the chest and abdomen very small, about 65 rows between the lateral-line and the median line of the abdomen. *Colours*—head and body of a deep purplish blue: free portion of the tail and all the fins gamboge yellow: some yellow on the snout, maxilla, chest, and opercular spines: an indistinct darkish band along the base of the spinous and first third of the rayed portion of the dorsal fin: ventral, and caudal with fine black tips.

Jerdon says (M. J. L. and Sc. 1851), p. 129, "*Serranus flavo-purpureus*, Bennett. This very beautiful fish is very rare at Madras. I never saw but one specimen. I procured the very young at the Sacrifice rocks on the Malabar Coast, it looked like a living sapphire." Bennett observes that it is scarce on the southern coast of Ceylon, in the course of two years having met but with one specimen.

Habitat.—Seas of India to the West coast of Africa. The specimen figured was from the Andaman islands, and is nearly $10\frac{1}{2}$ inches in length.

9. **Serranus fasciatus**, Plate III, fig. 2.

Perca fasciata, Forsk. p. 40; Gmel. Linn. p. 1316.
Epinephelus marginalis, Bl. t. 328, fig. 1; Bl. Schn. p. 300.
Holocentrus erythræus, Bl. Schn. p. 320.
Holocentrus oceanicus, marginatus, Forskalii et *rosmarus*, Lacép. Poiss. iv, pp. 377, 384, 389, and 392, t. 7, fig. 2 and 3.
Serranus marginalis, Cuv. and Val. ii, p. 302; Richards. Ich. China, p. 233; Bleeker, Perc. p. 34; Peters, Fish. Mossamb. p. 235, and Monats. Ak. Wiss. Berlin, 1865, p. 109; Günther, Catal. i, p. 135; Kner, Novara Fische, p. 24; Playfair, Fish. Zanzibar, p. 7.
Serranus variolosus, Cuv. and Val. ii, p. 354; Günther, Catal. i, p. 139 (not syn.)

* On the right side of one specimen there are two almost spinate teeth at the angle, as described by Bleeker, they are not thus present on the left side, where however the serrations are somewhat coarse.

Serranus oceanicus, Cuv. and Val. ii, p. 302; Günther, Catal. i, p. 109.

Serranus fasciatus, Klunz. Fische d. Roth. Meer, Verh. z. b. Ges. Wien. 1870, p. 681; Günther, Fische d. Sudsee, p. 6, t, 6.

Epinephelus fasciatus, Bleeker, Epinephelini, p. 119.

B. vii, D. $\frac{11}{15-17}$, P. 18, V. 1/5, A. $\frac{3}{7-8}$, C. 17, L. r. $\frac{95}{92}$.

Length of head from 3/10 to 2/7, of caudal 1/6, height of body 2/7 to 1/4 of the total length. *Eyes*—diameter 1/4 to 2/9 of the length of head, 1 diameter from end of snout, and 3/4 of a diameter apart. The maxilla extends to below the hind edge of the orbit. Preopercle rather strongly serrated along its vertical border, rather more coarsely so at its angle, above which it is somewhat emarginate, its lower limb entire. Sub- and inter-opercles either entire, or with a very few fine serrations. Central opercular spine the most developed. *Teeth*—canines in both jaws, the outer row of teeth in the maxilla, and the inner in the mandible larger than the villiform bands. *Fins*—dorsal spines from the third of about the same length, but not so high as the rays, the last are equal to two-fifths of the height of the body: pectoral slightly longer than the ventral, and equal to the length of the head behind the middle of the eye: ventral not reaching the vent: second anal spine the strongest, a little longer than the third which nearly equals the last in the dorsal fin: caudal rounded. *Scales*—on the body ctenoid: from 12 to 14 rows between the lateral-line and the base of the sixth dorsal spine. *Colours*—in *S. fasciatus* reddish or yellowish, with five dark vertical bands, a fine black edge along the whole of the dorsal fin. In *S. oceanicus* the cross bands may be absent. In *S. marginalis* brownish or yellowish, the dorsal, and caudal fins being black edged. In *S. variolosus* brownish, with spots over the head, body, and soft dorsal fins.

Sir J. Richardson directed attention to the *S. tsirimenara* of the 'Fauna Japonica' being distinguished from this fish, owing to its possessing a row of five or six irregular whitish and indistinct spots on the flanks. Bleeker observes that these spots are in two rows above, and below the lateral-line, irrespective of which on comparing specimens of the two species of the same length together, he found that in the *S. tsirimenara* the body is less rounded, the head more pointed, and the rows of scales above and below the lateral line are $\frac{115-120}{110-115}$.

Habitat.—From the Red Sea through those of India to the Malay Archipelago and beyond. The specimen figured was taken at the Andaman islands, and is 7 inches in length.

10. Serranus tumilabris, Plate III, fig. 3.

Serranus sumana, Cuv. and Val. ii, p. 344; Rupp. N. W. Fische, p. 102 and Atl. p. 104; Lefeb. Voy. Abyss. Zool. p. 229, pl. 5, f. 1; Klunzinger. Fische d. Roth. Meer, Verh. z. b. Ges. in Wien. 1870, p. 685 (not Forskal).

Serranus tumilabris, Cuv. and Val. ii, p. 346; Günther, Catal. i, p. 138; Playfair, Fish. Zanz. p. 8, pl. ii, f. 2.

Serranus Hoevenii, Bleeker, Verh. Bat. Gen. 1849, and Perc. p. 36; Günther, Catal. i, p. 138; Playfair, Fish. Zanz. p. 9, pl. ii, f. 3.

Serranus Kunhartii, Bleeker, Sumatra, p. 169.

Epinephelus Hoevenii, Bleeker, Atl. Ich. Perc. t. iv, f. 1, t. viii, f. 4, & t. xii, f. 4, and Epinephelini, p. 110.

B. vii, D. $\frac{11}{16}$, P. 17, V. 1/5, A. $\frac{3}{8}$, C. 19, L. r. $\frac{95}{85}$, L. tr. 21/—.

Length of head from 1/3 to 2/7, of caudal about 1/6, height of body from 2/7 to 1/4 of the total length. *Eyes*—diameter varies considerably, the following shows proportions in ten specimens in spirit. Four as *S. tumilabris* being as follows:—

1. Length of specimen $5\frac{2}{10}$ inches: diameter of eye 2/9 of length of head: third dorsal spine rather above 1/2 as long as head behind front edge of orbit.
2. Length of specimen $6\frac{1}{2}$ inches: diameter of eye 2/9 of length of head: third dorsal spine 1/2 as long as head behind the middle of the orbit.
3. Length of specimen 8 inches: diameter of eye 2/9 of length of head: third dorsal spine not quite 1/2 as long as head behind the front edge of orbit.
4. Length of specimen 9 inches: diameter of eye 1/5 of length of head: third dorsal spine 1/2 the length of the head behind the posterior nostril.

In No. 1, 2, and 3 the eye is 1 diameter from end of snout: in No. 4, $1\frac{1}{3}$ diameters.

Six marked as *S. Hoevenii* are as follows:—

1. Length of specimen $2\frac{2}{10}$ inches: diameter of eye 1/3 of length of head: third dorsal spine as long as the post-orbital portion of the head.
2. Length of specimen 6 inches: diameter of eye 2/9 of length of head: third dorsal spine 1/2 the length of the head behind the middle of the orbit.
3. Length of specimen $6\frac{1}{10}$ inches: diameter of eye $1/4\frac{1}{6}$ (6/25) of length of head: third dorsal spine 1/2 the length of the head behind the first 1/3 of the orbit.
4. Length of specimen $6\frac{5}{10}$ inches: diameter of eye $1/4\frac{1}{4}$ (4/17) of length of head: third dorsal spine 1/2 the length of the head behind the first 1/3 of the orbit.
5. Length of specimen $11\frac{7}{10}$ inches: diameter of eye $1/5\frac{1}{3}$ (3/16) of length of head: third dorsal spine half the length of the head behind the first 1/3 of the orbit.
6. Length of specimen 20 inches: diameter of eye 1/6 of length of head: third dorsal spine 1/3 the length of the head behind the front edge of the orbit.

In numbers 1, 2, 3, the eye is 1 diameter from the end of the snout: in number 4, 3/4 of a diameter: in number 5, $1\frac{1}{4}$ diameters: and in number 6, $1\frac{1}{3}$ diameters from the end of the snout.

The maxilla reaches to nearly or quite below the hind edge of the orbit. Vertical limb of preopercle slightly emarginate, with the angle rounded, the whole being finely serrated, most coarsely so at its angle: sub- and inter-opercles entire. In small specimens, e. g. $2\frac{1}{5}$ inches long, this species has a spine at its preopercular angle, which becomes absorbed as age advances: in some specimens some rather large denticulations are seen at this place, due to this absorption not having been so rapid as usual. *Teeth*—canines in both jaws, the outer row in the maxilla, and the inner in the mandible, rather larger than the villiform bands. *Fins*—dorsal spines from the third continue of about the same length, from 2/5 to 1/3 of the height of the body: the pectoral longer than the ventral, and equalling the length of the head behind the middle of the orbit: second anal spine the strongest, equal to or not quite so long as the third: caudal rounded. *Scales*—ctenoid, about 14 rows between the lateral-line and the base of the sixth dorsal spine. *Colours*—greyish olive, darkest along the back. Body and head covered with irregularly sized pearly-white spots, whilst a black line exists on the maxilla. Fins dark grey, externally nearly black, the pectoral, ventral, soft dorsal, and anal with a narrow white border: the whole of the dorsal fin white spotted. The colours vary much with age.

Habitat.—Red Sea, East coast of Africa, seas of India to the Malay Archipelago. The specimen figured is 6 inches long.

11. Serranus diacanthus, Plate III, fig. 4.

Cuv. & Val. ii, p. 319; Günther, Catal. i, p. 110; Kner, Novara Fische, p. 20.
Serranus sexfasciatus, Day, Fish. Malabar, (not Cuv. and Val.)
Damba, Sind: *Chaandcha*, Belooch.

B. vii, D. $\frac{11-12}{16-15}$, P. 18, V. 1/5, A. $\frac{3}{8-9}$, C. 17, L. r. $\frac{100}{95}$, L. tr. 19-21/45, Cæc. pyl. 11.

Length of head 1/3 to 3/10, of caudal 1/5 to 2/9, height of body 1/4 to 1/5 of the total length. *Eyes*—diameter 1/4 to 2/9 of the length of head, 1 diameter from the end of snout, and also apart. The maxilla reaches to below the hind edge of the orbit: lower jaw the longer. Vertical limb of preopercle strongly serrated, with two or three coarse teeth at its angle, its lower limb entire: sub- and inter-opercles entire. Three spines on the opercle, the centre of which is the largest. In a young specimen (3 inches long) the serratures at the angle of the preopercle are scarcely enlarged, but at $3\frac{1}{2}$ inches in length they commence to become coarser than those along the vertical border. *Teeth*—one or two canines on either side of each jaw, those in the mandible being the smaller: outer row in the upper jaw rather stronger than the villiform bands; inner row in the mandible a little the largest. *Fins*—dorsal spines rather weak, and being of nearly equal length from the third, which equals two-fifths of the length of the head: pectoral rather longer than the ventral: second anal spine rather longer than the third, and equal to the second of the dorsal fin: caudal rounded. *Scales*—ctenoid on body, and in about 20 rows between the first dorsal spine and the lateral-line. *Cæcal pylori*—eleven long ones. *Colours*—brownish, with a tinge of pink on the back, becoming rose-coloured on the abdomen. Six dark vertical bands, the first crossing the head: the second from the fourth to the sixth dorsal spines passing over the pectoral to the base of the anal: the remaining three take the same direction, the last crossing the free portion of the tail. A dark band passes from the orbit to the angle of the preopercle. Fins darkest at their margins. Occasionally the bands are continued on to the dorsal fin. A specimen in the British Museum has a white edge to the dorsal, caudal, and anal fins.

Dr. Jerdon, M. J. L. & Science, 1851, p. 129, observes of *S. nebulosus*, Cuv. & Val. "I procured one specimen of this at Madras and one at Tellicherry." The latter, a copy of the figure of which exists amongst Sir Walter Elliot's drawings, is the fish above described.

Habitat.—Seas of India to the Malay Archipelago: at Kurrachee I took them 18 inches in length.

12. Serranus sexfasciatus.

(Kuhl & v. Hass.) Cuv. & Val. ii, p. 360: Bleeker, Perc. p. 38: Günther, Catal. i, p. 108.
Epinephelus sexfasciatus, Bleeker, Atl. Ich. t. 281, Perc. t. iii, fig. 2 & Epinephelini, p. 103.

B. vii, D. $\frac{11}{15}$, P. 17, V. 1/5, A. $\frac{3}{8}$, C. 17, L. l. 85.

Length of head 3/11, of caudal 1/6, height of body 1/4 of the total length. *Eyes*—diameter 2/9 of length of head, 1 diameter from end of snout, and 3/4 of a diameter apart. The maxilla reaches to below the hind edge of the orbit. Vertical limb of preopercle rather coarsely serrated, with two large spinous teeth at its angle, the inferior of which is directed somewhat downwards. Opercular spines well developed. *Teeth*—small canines in both jaws, the inner row of teeth in the lower jaw, and outer one in the maxilla, longer than the villiform bands. *Fins*—dorsal spines moderately strong, increasing in length to the fourth and fifth, which equal nearly half the length of the head, but are not quite so high as the rays: soft portion of fin, also of the anal, and the caudal rounded: pectoral as long as the head excluding the snout: second anal spine stronger but not quite so long as the third. *Scales*—ctenoid. *Colours*—brownish, with about six vertical darker bands, about as wide as the ground colour: a few irregular dark spots about the body: dorsal, caudal, and anal yellow, with numerous round black spots, those at the hind edge of the caudal almost forming a black band with a white outer edge: pectoral and ventral greyish.

I examined two specimens of this species from Japan in the Berlin Museum, the largest being about 7 inches in length. This species I have not captured in India, the form I termed *S. sexfasciatus* being the

S. diacanthus as was pointed out to me by Professor Peters, who also showed me one of Val. typical specimens in the Berlin Museum.

13. Serranus lanceolatus, Plate IV, fig. 1.

Holocentrus lanceolatus, Bl. t. 242, f. 1; Bl. Schn. p. 315; Lacép. iv, pp. 380, 383.

Perca suggulathoo boutoo, Russell, Fish. Vizag. ii, p. 23, pl. 130.

Serranus lanceolatus, Cuv. & Val. ii, p. 316; Bleeker, Perc. p. 35; Cantor, Catal. p. 8; Günther, Catal. i, p. 107 & Zool. Record 1869, p. 128; Blyth, Proc. Asiatic Soc. of Beng. xxix, p. 111; Day, Fishes of Malabar, p. 4, pl. 1, fig. 1 & 2, & Proc. Zool. Soc. 1869, p. 512 & 1871, p. 635; Playfair, Fishes of Zanzibar, p. 4.

Serranus horridus, Cantor, Catal. p. 9 (not Cuv. & Val.)

Epinephelus lanceolatus, Bleeker, Epinephelini, p. 73.

Kurrupu, Mal.: *Commauree*, if young *Wutla-callawah* or 'perch with a sore head,' Tam.: *Gussir*, Sind.: *Bole*, Chittagong: *Nga-towktoo-shweydoo*, Arrak.

B. vii, D. $\frac{11}{14-16}$, P. 19, V. 1/5, A. $\frac{3}{8-9}$, C. 15, L. r. $\frac{110}{70}$, L. tr. 20/52, Cæc. pyl. many.

Length of head 4/13 to 2/7, of caudal 1/5 to 1/6, height of body 2/7 to 1/4 of the total length. *Eyes*—diameter 1/6 to 1/8 in the length of the head, 1 to $1\frac{1}{2}$ diameters from the end of snout, and from 1 in the young to $1\frac{1}{4}$ in the adult apart. The maxilla reaches to a little beyond the vertical from the hind edge of the orbit. Preopercle with its vertical edge having a shallow emargination above the angle, and finely serrated, becoming somewhat coarsely so at the angle: its lower edge, and also the sub- and inter-opercles entire. Opercle with the central spine most distinct. In the fry there is a well-developed spine at the angle of the preopercle. *Teeth*—a small canine on either side of upper jaw, and a still smaller one in the lower jaw: no enlarged row in the upper jaw, but the inner row in the mandible, especially posteriorly, much the largest. *Fins*—dorsal spines* not so high as the rays, its soft portion and also that of the anal rounded: pectoral longer than the ventral, and equal to the postorbital portion of the head: second anal spine stronger but shorter than the third: caudal rounded. *Scales*—cycloid, but usually with raised circular lines upon them, especially in the forepart of the body, about 15 rows between the 6th dorsal spine and the lateral-line. *Cæcal-pylori*—very short, consequently in the young appear almost like a gland. *Colours*—vary with age, the very young being of a fine citron or sulphur ground-colour, having irregular vertical bands and markings, which become more distinct as the age of the fish advances. About to a foot or even eighteen inches in length, the ground colour continues to be bright yellow, with five vertical, blackish-blue bands, the first passing from the orbit downwards over the preopercle; the second from the nape to the opercle joins the first band in its posterior margin, and coalesces with the third behind or above the pectoral fin: the third proceeding from the bases of seven dorsal spines (3-10), passes downwards to the abdomen: the fourth passes from the fifth to the last dorsal ray, and descends to the base of the anal fin: the last surrounds the free portion of the tail. *Fins*—yellow with black spots or blotches, forming confluent bars at their bases, which on the pectoral are disposed in three or four undulating arched bands. In the adult the black bands disappear, the ground colour becomes greyish-brown, the whole being reticulated with greyish-black lines. The fins retain most of their original yellow colour but the amount of the black decreases.

Amongst Sir Walter Elliot's drawings are two of the adult of this fish, termed *Punni min* and *Pilli punni*, having a remark attached "younger with transverse bars."

In "Fishes of Malabar," I considered, as Cantor had previously done, that *S. horridus* was the adult of this species. Dr. Bleeker, however, who appears to have inspected the specimen at Leyden, states it to be *Serranus fuscoguttatus*.

Habitat.—East coast of Africa and seas of India to the Malay Archipelago, attaining a large size. The specimen figured is about 15 inches long, and intermediate between the two figured in the "*Fishes of Malabar*," it is not included in the five referred to in the note. Respecting this fish, Cantor observes that "in one, the weight of which exceeded 130lbs., the stomach contained remains of *Stromateus*, *Sphyrna Blochii*, and of a *Limulus*."

14. Serranus erythrurus.

Cuv. & Val. ii, p. 320.

B. vii, D. 11/16, P. 17, V. 1/5, A. 3/9, C. 17.

Vertical border of preopercle finely serrated, its horizontal limb entire. *Fins*—rounded. *Colours*—on the back and upper surface of the head greenish, variegated with red, silvery-white below: dorsal greenish: ventral, anal, and pectoral yellowish: tail reddish.

* To show how the comparative length of the dorsal spines vary, not only with age, but with specimens, I subjoin the measurements of five in my collection:

1.	Length of	specimen	$4\frac{8}{10}$	inches:	of 4th	dorsal spine	equal to	$\frac{1}{12}$	of the entire	length of the fish.
2.	"	"	$7\frac{5}{10}$	" :	"	"	"	$\frac{2}{25}$	"	"
3.	"	"	13	" :	"	"	"	$\frac{1}{13}$	"	"
4.	"	"	13	" :	"	"	"	$\frac{1}{16}$	"	"
5.	"	"	22	" :	"	"	"	$\frac{1}{27}$	"	"

The late Mr. Blyth having examined pl. 1, in the *Fishes of Malabar*, suggested my asserting on his authority, that they represented the identical species he referred to in the *Pro. of the Asi. Soc.* and were the young and old of one sort.

Habitat.—Malabar to 3 feet in length. I have not seen this species that I am aware of, unless it is a *Lutianus*. It may probably be Russell's *Rangoo*.

15. Serranus Malabaricus, Plate IV, fig. 2.

Holocentrus Malabaricus, Bl. Schn. p. 319, pl. 63.
Holocentrus pantherinus, Lacép. Poiss. iii, t. 27, f. 3 and iv, pp. 389 and 392.
Perca bontoo and *P. madinawa bontoo*, Russell, Fish. Vizag. ii, pp. 20, 21, pl. 127 and 128.
Bola ? coioides, Ham. Buch. Fish. Ganges, pp. 82, 369.
Serranus bontoo, Cuv. and Val. ii, pp. 334, vi, p. 523; Cantor, Catal. p. 11; Günther, Catal. i, p. 138; Day, Fish. Malabar, p. 3.
Serranus suillus, Cuv. and Val. ii, p. 335; Bleeker, Verh. Bat. Gen. xxii, p. 9; Günther, Catal. i, p. 127; Playfair, Fish. Zanz. p. 5.
Serranus maculosus et *pantherinus*, Cuv. and Val. ii, pp. 332 and 333.
Serranus crapao, Cuv. and Val. iii, p. 494; Rich. An. and Mag. Nat. Hist. 1842, ix, p. 25; Bleeker, Verh. Bat. Gen. xxii, Perc. p. 37; Günther, Catal. i, p. 137.
Serranus diacopeformis, Benn. Life Raffles, Fish. Sumatra, p. 686.
Serranus nebulosus et *schihpan*, Richards. Ich. China, pp. 231, 232.
Serranus coioides, Cantor, Catal. p. 11.
Epinephelus crapao, Bleeker, Atl. Ich. Perc. t. viii, f. 1.
Epinephelus pantherinus, Bleeker, Epinephelini, p. 78.
Punni-calawah, Tam.: *Bontoo*, Tel.: *Bool*, Chittagong: *Nga-towktoo*, Arrak.: *Kyouk-theyga-kakadit*, Burm.: *Rāb-na-dah* and *O-ro-tam-dah*, Andamanese.
Variety, *S. bontoo*, *Madinawah bontoo*, Tel.: *Row-je-dah*, Andam.

B. vii, D. $\frac{11-12}{15-17}$, P. 19, V. 1/5, A. $\frac{3}{8-9}$, C. 15, L. l. 90, L. r. $\frac{105}{95}$, L. tr. 19/50, Cæc. pyl. 50-60.

Length of head $3\frac{1}{3}$ to $3\frac{2}{3}$, of caudal 1/5 to 1/6, height of body 2/7 to 1/4 of the total length. *Eyes*—diameter 1/5 to 1/6 of length of head, 1 to $1\frac{1}{2}$ diameters from the end of snout, and the same apart. Interorbital space flat: the præmaxillary reaching to opposite the front edges of the orbit. The maxilla extends to below the posterior edges of the orbit, or even behind it in large specimens. Vertical limb of preopercle slightly emarginate, finely serrated, becoming more coarsely so at its rather square angle, where there exist from four to seven coarse teeth, its lower margin entire, as are also the sub- and inter-opercles, occasionally there are two or three serrations on the inter-opercle. Opercle with three spines, the central one being the longest. The fry has no spine at the angle of the preopercle. *Teeth*—one or two canines in either jaw, those in the upper usually the longer: the outer row of teeth in the upper jaw, and the inner in the lower, are the largest. *Fins*—the dorsal spines from the third are of about the same height, and equal to one-half the length of the post-orbital portion of the head, but not so high as the rays: the pectoral is longer than the ventral, and about equal the post-orbital portion of the head in length, soft portions of dorsal and anal fins rounded: the second anal spine in most estuary specimens equal the length of the third, but in marine ones it is often slightly shorter: caudal rounded. *Scales*—ctenoid, and in about 15 rows between the 6th dorsal spine and the lateral line. *Cæcal pylori*—from 50 to 60, but two or more open into a single basal tube. *Colours*—brownish, fading to grey or dirty white on the abdomen: the whole of the fish, even over to the branchiostegal rays covered with bright yellow or orange spots, which often become brown after death: three large blotches on the inter-opercle appear to be present in all varieties of this fish. In the *S. Malabaricus* Bloch, some brown spots are often during life intermingled with the orange ones, and it is vertically banded usually as follows; one passes from the first four dorsal spines to the pectoral fin: another from between the second and ninth to the abdomen: two more descend from the soft dorsal fin, and a fifth encircles the free portion of the tail: pectoral reddish spotted with yellow, sometimes the caudal, pectoral and ventral fins are unspotted but marked with darker shades, or the bands are continued on to them. This variety is the commonest, mostly marine, and the bands are unusually well marked in the young. In the variety *S. bontoo*, the bands when present bifurcate inferiorly, and the spots are all black; this is a marine and the rarest form, never appearing to attain to a large size. In the variety *S. coioides*, H. B. = *S. suillus*, C. V. the bands are absent, or else indistinctly visible; this is mostly taken in estuaries or large rivers, as the Hooghly at Calcutta.

Russell observed that the plate 128 (*S. bontoo*) may perhaps "be merely a variety" of plate 127 (*S. coioides*). Hamilton Buchanan, p. 82, remarked of his *coioides*, "this fish agrees so well with the description of the *medinawa bontoo* of Dr. Russell (Indian Fishes, vol. ii, no. 128) that I do not think them different species," p. 82. Cuvier considered Russell's species distinct: Playfair, "Fishes of Zanzibar," doubted if they might not be identical.

Russell records one taken at Vizagapatam in January 1786, which measured 7 feet in length, 5 in girth, and weighed upwards of three hundred pounds. Amongst Sir Walter Elliot's drawings is a figure of the banded variety *S. Malabaricus*, marked *Serranus suillus* and *Kullăwăee*: a foot and a half in length is given as the size of the specimen.

The fish figured, pl. iv, fig. 2, is the variety *coioides*, the specimen being about 21 inches in length, and taken at Calcutta.

In one specimen of the variety *S. bontoo* $8\frac{3}{10}$ inches long, not only has it 12 dorsal spines, but the sixth has also two separate spinate terminations.

Habitat.—Seas of India to the Malay Archipelago, China, and beyond, attaining to a very large size.

16. Serranus corallicola.

(Kuhl. and v. Hass.) Cuv. and Val. ii, p. 336.
Serranus altivelioides, Bleeker, Perc. p. 38; Günther, Catal. i, p. 127; Kner, Novara Fische, p. 23.
Epinephelus altivelioides, Bleeker, Atl. Ich. Perc. t. xxx, f. 1.
Epinephelus corallicola, Bleeker, Epinephelini, p. 83.

B. vii, D. $\frac{11}{15-16}$, P. 18, V. 1/5, A. $\frac{3}{8}$, C. 17, L. r. $\frac{95}{85-90}$ (Cæc. pyl. 9, Kner.)

Length of head from $3\frac{2}{5}$ to $3\frac{2}{3}$, height of body 2/7 to nearly 1/4 of total length. *Eyes*—diameter from $4\frac{1}{3}$ to 1/5 in the length of the head, and from 1/2 to 1 diameter apart. The maxilla reaches to below the hind edge of the orbit. Vertical edge of the preopercle serrated, its lower limb and also the sub- and inter-opercles entire: central opercular spine the most developed. *Teeth*—canines in both jaws. *Fins*—dorsal spines increase to the third or fourth which are about 2/5 of the height of the body, and 1/5 lower than the rays: pectoral as long as the head without the snout: second anal spine the strongest, a little longer than the third and equal in length to the last in the dorsal fin: caudal rounded. *Scales*—ctenoid on the body, about 14 rows between the lateral line and the base of the sixth dorsal spine. *Colours*—greyish-brown covered all over with black spots, soft dorsal, anal, pectoral, and caudal with a light edge.

Habitat—stated (Kner) to have been taken at Madras, found in the Malay Archipelago.

17. Serranus salmoides, Plate IV, fig. 3.

Holocentrus salmoides, Lacép. iii, pl. 34, fig. 3, iv, p. 346.
Serranus salmoides, Cuv. and Val. ii, p. 343.
? *Serranus polypodophilus*, Bleeker, Perc. p. 37.
Serranus salmonoides, Günther, Catal. i, p. 128; Klunz. Verh. z. b. Ges. Wien. 1870, p. 682.
? *Epinephelus polyphodophilus*, Bleeker, Atl. Ich. Perc. t. v. fig. 1, and Epinephelini, p. 101.

B. vii, D. $\frac{11}{15-16}$, P. 18, V. 1/5, A. $\frac{3}{8}$, C. 17, L. r. $\frac{105}{90}$, L. tr. 24/50.

Length of head 3/10 to 2/7, of caudal 1/6, height of body 4/15 to 1/4 of the total length. *Eyes*—diameter 2/13 of length of head, $1\frac{1}{2}$ to 2 diameters from the end of snout, and $1\frac{1}{2}$ apart. The interorbital space rather convex: the posterior end of the præmaxillary extends to behind the level of the front edge of the orbit. The maxilla reaches to rather beyond the posterior edge of the orbit. Preopercle slightly emarginate, serrated along its vertical margin, with five or six denticulations at its angle, lower limb entire, as are also the sub- and inter-opercles. Central opercular spine moderately distinct, the others indistinct. *Teeth*—small canines in both jaws: an outer enlarged row in the maxilla, and an inner in the mandible larger than the villiform bands. *Fins*—third dorsal spine one third of the length of the head, they gradually decrease to the last but none are so long as the rays: soft portions of the dorsal and anal fins rounded. Pectoral longer than the ventral, equalling the length of the postorbital portion of the head, it hardly reaches 2/3 of the distance to above the anal spines: second anal spine the strongest, but not so long as the third, which equals one-fourth to one-fifth of the length of the head: caudal rounded. *Scales*—cycloid on the head, ctenoid on the body. *Colours*—dark reddish-brown, having round black spots over the head, body, and fins, those on the head and jaws small. Large blotches or ill-defined bands on the body. In one of Val. specimens, these bands are well marked.

The specimen figured was captured at the Andaman islands, it is about 12 inches in length.

Habitat—Red Sea, seas of India to the Malay Archipelago. It is not common in India.

18. Serranus semipunctatus.

Cuv. and Val. ii, p. 341; Günther, Catal. i, p. 114.

B. vii, D. $\frac{11}{16}$, P. 17, V. 1/5, A. $\frac{3}{8}$, C. 17.

Length of head 3/10, of caudal 4/21, height of body 4/17 of the total length. *Eyes*—diameter 1/6 of length of head, $1\frac{1}{3}$ diameters from end of snout, and $1\frac{1}{4}$ apart. Upper surface of head broad and flat. The maxilla reaches to below the hind edge of the orbit. Serrations on preopercle strong, having three coarse teeth at its angle, but not spinate as in *S. sexfasciatus*. *Teeth*—moderately sized canines in both jaws, an outer enlarged row in the maxilla, and several irregularly pointed teeth mixed with the villiform ones in the mandible. *Fins*—dorsal spines moderately strong, increasing in length to the fifth, which equals half the postorbital length of the head, and is not quite so high as the rays: the soft portion of the fin, and also of the anal rather angular: pectoral as long as the postorbital portion of the head, and extending to nearly over the anal spines: ventral not quite so long: third anal spine a little the longest, and equalling the third of the dorsal, the second spine a little the strongest: caudal large, fan-shaped, and equal to the pectoral in size. *Colours*—body reddish-brown, with six or seven broad darker vertical cross bands: head and first portion of the body, as well as the free portion of the tail, with some small well-marked spots: dorsal and anal yellow, and likewise spotted: ventral grey.

It has been suggested that *Perca septemfasciate*, Thunb. (Nov. Ac. Stock. 1793, pl. i, f. 1) is this species; the specimen figured was obtained in Japan, and Professor Peters was good enough to show me one of Temm. and Schlegel's types of *Plectropoma susuki* from Japan, the two being compared appeared to entirely agree, whereas the *P. susuki* is evidently distinct from the *S. semipunctatus*.

Habitat—Pondicherry, attaining at least 12 inches in length.

19. Serranus summana, Plate IV, fig. 4.

Perca summana, Forsk. p. 42; Gmel. Linn. p. 1317.
Bodianus summana, Bl. Schn. p. 334.
Pomacentrus summana, Lacép. iii, p. 511.
Serranus polystigma, Bleeker, Sumatra, ii, p. 2; Günther, Catal. i, p. 129.
Serranus summana, Playfair, Fish. Zanz. p. 8, pl. ii, fig. 1 (not Cuv. and Val. &c.).
Epinephelus summana, Bleeker, Epinephelini, p. 105.

B. vii, D. $\frac{11}{15-16}$, P. 17, V. 1/5, A. $\frac{3}{8}$, C. 17, L. r. $\frac{100}{90}$, L. tr. 21/48.

Length of head from 3/10 to 2/7, of caudal 2/11, height of body from 3/10 to 2/7 of the total length. *Eyes*—diameter from 1/4 to 1/5 of the length of head, $1\frac{1}{3}$ diameters from the end of snout, and also apart. The maxilla reaches to below the last third of the orbit. Preopercle with a very shallow emargination above its angle, its vertical border finely serrated, its lower as well as the sub- and inter-opercles entire. Central opercular spine the most developed. *Teeth*—moderate sized canines in both jaws, the outer row of teeth in the maxilla and the inner in the mandible rather larger than the villiform bands. *Fins*—dorsal spines of moderate strength, the third to the fifth being the longest, equalling $2\frac{2}{5}$ in the height of the body, and slightly decreasing to the last: the soft portion of the fin higher than the spinous, somewhat angular, as is also that of the anal: pectoral longer than the ventral, and equalling the length of the head, excluding the snout: second anal spine the strongest, rather longer than the third, and equalling the highest in the dorsal fin: caudal rounded. *Scales*—ctenoid on the body, about 13 rows between the lateral-line and the base of the sixth dorsal spine. *Colours*—brownish, the body and vertical fins covered with small round white dots, which are minute on the head or even absent, a black spot above the maxillary: soft portions of dorsal and anal fins with dark edges, having white margins.

Klunzinger observes that some specimens of *S. leucostigma*, C.V. are the young form of *S. summana*, C.V.=*S. tumilabris*, C.V. Peters has shown that *Holocentrus cæruleopunctatus*, Bloch=*S. alboguttatus*, C.V.=*S. leucostigma*, C.V.

Habitat.—Red Sea, East coast of Africa, seas of India to the Malay Archipelago. It is very common at the Andamans, where the specimen figured, (10 inches long) was captured.

20. Serranus dermochirus.

Cuv. and Val. vi, p. 513.

B. vii, D. $\frac{11}{16}$, P. 17, V. 1/5, A. $\frac{3}{8}$, C. 17.

Length of head 4/13, of caudal 2/9, height of body 4/13 of the total length. *Eyes*—diameter 2/9 of length of head, 1 diameter from end of snout, and nearly 1 apart. The maxilla reaches to somewhat behind the hind edge of the orbit. Preopercle, with its vertical margin finely serrated, three well developed opercular spines, the central one being the longest. *Teeth*—a pair of canines on either side of both jaws, an outer enlarged row along the sides of the upper jaw, and an inner one in the lower. *Fins*—dorsal spines strong, increasing in length to the fourth, which equals two diameters of the orbit: pectoral longer than the ventral, and equal to the length of the head behind the front edge of the orbit. Although, doubtless, the skin covering the fins is thick, it does not appear to be remarkably so. *Colours*—the specimen appears to be covered with fine white spots along each row of scales. It much resembles and is probably identical with *S. summana*.

Habitat.—Malabar. The specimen is over 12 inches in length.

21. Serranus morrhua, Plate V, fig. 1.

Cuv. and Val. ix, p. 434; Günther, Catal. i, p. 154; Klunz. Verh. z. b. Ges. Wien. 1870, p. 678.
Serranus pœcilinotus, Temm. Schleg. Fauna Japon. Poiss. pl. iv, A. f. 1; Richards. Ich. China, p. 233; Bleeker, Verh. Bat. Gen. xxvi, p. 61; Günther, Catal. i, p. 155.
Serranus radiatus, Day, Proc. Zool. Soc. 1867, p. 699.

B. vii, D. $\frac{11}{14-15}$, P. 19, V. 1/5, A. $\frac{3}{8}$, C. 17, L. r. $\frac{130}{115}$, L. tr. 21/46.

Length of head nearly 1/3, of caudal 1/6, height of body 2/7 of the total length. *Eyes*—diameter 1/4 of length of head, 1 diameter from end of snout, and 1/2 a diameter apart. The maxilla reaches to below the hind edge of the orbit. Vertical limb of preopercle slightly oblique, serrated, and with three or four strong denticulations at its angle, its horizontal edge as well as the sub- and inter-opercles entire: opercle with three spines, the central one the longest. *Teeth*—canines in both jaws, the outer row of teeth in the maxilla, and the inner in the mandible, larger than the villiform bands. *Fins*—dorsal spines moderately strong, increasing in length to the third which equals two-fifths of the height of the body, and is nearly as high as the rays: third anal spine the strongest, the second of nearly similar length and about equal to the third of the dorsal fin: pectoral as long as the head behind the middle of the eye: ventral nearly reaching the vent: caudal rounded. *Scales*—on body ctenoid, 14 rows between the lateral-line and the base of the sixth dorsal spine: none on the preorbital nor on the maxilla in the young. *Colours*—(in the young) greenish-olive, becoming dull yellow on the abdomen. A broad irregular-shaped bluish-white band passes from the posterior edge of the occiput to meet a similar one from the opposite side: two more descend from the lower and posterior edge of the orbit to the base of the pectoral fin: another proceeds from the upper margin of the preopercle, at first backwards, and opposite the posterior third of the pectoral it curves upwards to the middle of the spinous dorsal on to which it is continued.

A small patch of similar colour exists in front of the base of the dorsal. Another band goes from the hind edge of the pectoral to the front of the soft dorsal: two more similar bands cross the base of the tail, and several shorter marks exist over the body. Spinous dorsal nearly black, soft dorsal and other fins yellow. Eyes golden.

A young specimen exists in the Paris Museum, in which there are dark spots along the lines which bound the light spaces.

Adults are brownish, with about four curved longitudinal bands along the body, and four or five oblique bands on the head, radiating from the eye.

Amongst Sir Walter Elliot's drawings is a figure of this species, $3\frac{6}{10}$ inches long, also of the young, $1\frac{1}{10}$ inches, with the remark "taken at Waltair, March 9th, 1853."

Habitat.—From the Red Sea through those of India to Japan: the specimen figured (life size) was captured at Madras in 1867.

22. Serranus angularis, Plate V, fig. 2.

Serranus angularis, Cuv. and Val. vi, p. 353; Günther, Catal. i, p. 126.

Serranus Celebicus, Bleeker, Celebes, i, p. 117; Günther, Catal. i, p. 139; Klunz. Verh. z. b. Ges. Wien, 1870, p. 676.

Serranus areolatus, Playfair (not Cuv. and Val.) Proc. Zool. Soc. 1867, p. 848.

Serranus glaucus, Day, Proc. Zool. Soc. 1870, p. 678.

Epinephelus Celebicus, Bleeker, Atl. Ich. Perc. xi, fig. 3, and Epinephelini, p. 69.

B. vii, D. $\frac{11}{15-17}$, P. 17, V. 1/5, A. $\frac{3}{8}$, C. 17, L. l. 70, L. r. 105, L. tr. 23/40, Cæc. pyl. 13-14.

Length of head 2/7, of caudal 2/11, height of body 2/7 to 4/15 of the total length. *Eyes*—diameter 1/4 to 1/5 of the length of head, $1\frac{1}{4}$ diameters from the end of snout, and 3/4 to 1 diameter apart. The maxilla reaches to below the last third of the orbit. Preopercle serrated, angle slightly produced, having two or three strong denticulations (more developed in some specimens than in others), the inferior of which sometimes is directed downwards: occasionally there are a few denticulations upon the sub- and inter-opercles. Opercular spines well developed, the central one the longest. *Teeth*—canines in both jaws, largest in the upper: outer row of teeth in maxilla and inner in mandible larger than the villiform bands. *Fins*—dorsal spines rather strong, increasing in length to the third which equals 3/7 of the height of the body, and is rather more than that of the rays: pectoral as long as the head, excluding the snout, and longer than the ventral: second anal spine strongest but not quite so long as the third, which equals one and a quarter diameters of the orbit: caudal emarginate. *Scales*—ctenoid. *Colours*—greyish, becoming dirty white along the abdomen: head and body studded rather closely with yellow spots, which become brown in preserved specimens: pectoral, dorsal, anal, and caudal also spotted, which spots sometimes form lines or bands, and all the fins with a black margin edged with white.

Habitat.—Seas of India and Ceylon to the Malay Archipelago, attaining two feet or more in length; the specimen figured is 7 inches long.

23. Serranus fuscoguttatus, Plate V, fig. 3.

Perca summana, var. *fuscoguttata*, Forsk. p. 42; Gmel. Linn. p. 1317.

Serranus fuscoguttatus, Rüpp. Atl. Fische, p. 108, t. 27, fig. 2; Peters, Wieg. Arch. 1855, p. 235; Günther, Catal. i, p. 127; Kner, Voy. Novara, Poiss. p. 22; Playfair, Fish. Zanzibar, p. 5; Klunz. Verh. zool.-bot. Ges. in Wien, 1870, p. 684.

Serranus horridus (Kuhl. and V. Hass.) Cuv. and Val. ii, p. 321; Bleeker, Perc. p. 36; Günther, Catal. p. 136.

Serranus geographicus, (Kuhl. and v. Hass.) Cuv. and Val. ii, p. 322; Günther, Catal. i, p. 150.

Serranus dispar, Playfair, Fish. Zanz. p. 6, pl. i, fig. 2 and 3; Günther, Fische d. Sudsee, Heft i, p. 9.

Epinephelus horridus, Bleeker, Atl. Ich. Perc. t. xxix, f. 3.

Epinephelus fuscoguttatus, Bleeker, Epinephelini, p. 93.

B. vii, $\frac{11}{14-15}$, P. 19, V. 1/5, A. $\frac{3}{8-9}$, C. 17, L. r. $\frac{100}{90}$, L. tr. 22/56 (Cæc. pyl. 24, Kner).

Length of head from 1/3 to 4/13, of caudal 1/6, height of body 4/13 to 2/7 of the total length. *Eyes*—diameter 2/9 to 1/6 of the length of head, $1\frac{1}{4}$ diameters from the end of snout, and 1 apart. The maxilla reaches to beyond the vertical from the hind edge of the orbit. Preopercle usually convex, but in some specimens with a very shallow emargination above its rounded angle, serrated in its whole extent, most coarsely so at its angle, lower limb and also the sub- and inter-opercles entire. Opercle with rather badly developed spines, the central one the most conspicuous. *Teeth*—small canines in both jaws, the outer row in the maxilla and the inner in the mandible, larger than the villiform bands. *Fins*—dorsal spines rather strong, from the third of about equal length and not so long as the rays, the third equals about 2/7 of the length of the head: pectoral longer than the ventral, and as long as the postorbital portion of the head: third anal spine equal in length to the third dorsal one, and though longer, not so strong as the second: caudal rounded. *Scales*—cycloid. *Colours*—greyish, with brown spots of a larger or smaller size irregularly disposed, they are sometimes hexagonal on the head: pectoral and caudal may be banded: sometimes three or four narrow white lines cross the lower jaw. There are some larger blotches on the head and body, and one across the free portion of the tail. In some specimens only the large cloudy blotchings or markings are present on the body.

Habitat.—Red Sea, East coast of Africa, seas of India, Malay Archipelago and beyond. The specimen figured is $9\frac{1}{2}$ inches in length and from the coast of Sind.

24. Serranus grammicus, Plate V, fig. 4.

Day, Proc. Zool. Soc. 1867, p. 700.

B. vii, D. $\frac{11}{12}$, P. 19, V. 1/5, A. $\frac{3}{8}$, C. 17, L. l. 85, L. r. $\frac{105}{86}$, L. tr. 17/44.

Length of head about 2/7, of caudal 1/6, height of body 2/7 of the entire length. *Eyes*—diameter 1/5 of length of head, $1\frac{1}{3}$ diameters from the end of snout, and 1 apart. The maxilla reaches to below the posterior edge of the orbit. Vertical limb of preopercle oblique, finely serrated in its upper two-thirds, becoming coarser lower down, and having several large denticulations at its angle, which is slightly produced: its lower limb entire as are also the sub- and inter-opercles. Opercle with three spines, the central one the strongest. *Teeth*—a small canine on either side of the upper jaw: a slightly enlarged outer row in the maxilla, and an inner one in the mandible. *Fins*—dorsal spines of moderate strength, the fourth slightly the longest, and equal to one and a third diameters of the orbit in length, but not so long as the rays: pectoral as long as the postorbital portion of the head, and longer than the ventral, which latter only reaches half way to the vent: second anal spine the strongest, the third one-fourth longer, and equal to the second in the dorsal fin: soft portions of the dorsal and anal somewhat rounded: caudal very slightly rounded. *Scales*—cycloid, with raised roughened irregularly disposed lines upon them, those between the pectoral fin and the lateral-line being the largest. Snout and suborbital ring of bones scaled, very few on preorbital or maxilla. *Colours*—greyish with a golden gloss about the head. A narrow black line runs from the upper margin of the orbit to the last dorsal spine: a second passes from the upper third of the orbit to the superior opercular spine and on to the base of the sixth dorsal ray: a third from the lower edge of the orbit to below the central opercular spine and on to the upper third of the caudal fin, where it assumes the form of rounded blotches: an intermediate band exists on the head between the second and third. Dorsal fin with a row of black spots along its centre and tipped with black: caudal yellow, with numerous black spots, and the extremities of its rays black, anal with a black edge. Eyes golden.

Dr. Jerdon, in the Madras Journ. Lit. and Sc. 1851, p. 130, remarks: "I possess a drawing of another *Serranus* of a reddish-fawn-colour, brownish on the back, with three longitudinal brown lines," otherwise as described above. The figure he alludes to is amongst Sir Walter Elliot's illustrations.

Habitat.—Madras, where the above single male specimen, 15 inches in length, was taken in 1867.

25. Serranus boenack, Plate VI, fig. 1.

Bodianus boenack, Bloch, iv, p. 44, t. 226; Bl. Schn. p. 330.
Perca rahtee bontoo, Russell, Fish. Vizag. ii, p. 22, pl. 129.
Sciæna formosa, Shaw, Zool. Misc. p. 23, t. 1007.
Serranus formosus, Cuv. & Val. ii, p. 311; Richards. Ich. China, p. 233; Bleeker, Perc. p. 31; Günther, Catal. i, p. 154; Day, Fish. Malabar, p. 7; Kner, Novara Fische, p. 26.
Serranus boenach, Cuv. & Val. ii, p. 362.
Serranus boenack, Peters, Monats. d. Akad. Berlin, 1865, p. 105.
Epinephelus formosus, Bleeker, Epinephelini, p. 59.
Epinephelus boenach, Bleeker, Fish. Madagascar, p. 8.
Verri-cullawah, Tam.

B. vii, D. $\frac{9}{16-18}$, P. 15, V. 1/5, A. $\frac{3}{8-9(10)}$, C. 17, L. l. 90-95, L. tr. 22/43.

Length of head 2/7 to 3/8, of caudal 1/5 to 1/6, height of body 1/3 to 3/10 of the total length. *Eyes*—diameter 1/5 to 2/11 of length of head, rather above 1 diameter from end of snout, and 3/5 of a diameter apart. The maxilla reaches to below the last third or hind margin of the orbit. Vertical limb of preopercle rather convex, and a little emarginate above its angle in the adult but not in the young, its upper two-thirds finely serrated, more coarsely so at its angle, where the serrations are rather irregularly disposed: lower limb entire, as are also the sub- and inter-opercles (in one specimen both sub- and inter-opercles are serrated). Three strong opercular spines, the central being the most developed. *Teeth*—one or two strong canines or either side of both jaws, the upper being generally somewhat the larger: the outer row in the upper jaw, and the inner in the lower, being larger than the others. *Fins*—dorsal spines from the third are of about the same length, the longest being 3/4 the length of the longest ray: soft portions of the dorsal and anal obtusely angular: second anal spine the strongest, equal in length to the third in the adult or even longer in the young: caudal rounded. *Scales*—ctenoid, covering the forehead and preorbital but none on maxilla. *Colours*—when alive very brilliant, but fading after death. Generally yellowish-brown, snout pale blue, lips and throat spotted with a deeper blue, whilst about five fillets of the same colour diverge from the orbit and cross the opercles and branchial membranes. Blue and rather tortuous horizontal lines pass from the head towards the tail below the lateral line, whilst above it are about eight more directed backwards, upwards, and continued on to the dorsal fin throughout its whole extent; these blue lines are likewise continued on to the other fins, except (occasionally on) the ventrals, which however become nearly black at their extremities. Some blue spots exist anterior to the base of the ventral fin (male), also occasionally on the jaws.

There are three figures of this fish amongst Sir W. Elliot's drawings, termed *Nama panni*, *Neela panni*, and *Panaina kullawaie*: one was captured at Waltair, March 24th, 1853.

The specimen termed *Serranus formosus*, "adult: stuffed Isle de France," in the British Museum Catalogue l. c. is, as Dr. Bleeker suggests (Fish. Madagascar. p. 20), identical with *Epinephelus Polleni*, Bleeker, l. c. p. 19: the caudal is cut nearly square instead of being rounded as in *S. boenack*. A beautiful specimen exists in the Paris Museum received from M. Liénard, of the Mauritius, but the description I am unable to recognise in his papers.

Habitat.—Seas of India and Malay Archipelago to China.

26. Serranus miniatus, Plate VI, fig. 2.

Perca miniata, Forsk. p. 41; Linn. Gmel. p. 1317.

Bodianus miniatus, Bl. Schn. p. 332.

Serranus miniatus, Rüpp. Atl. Fische, p. 106, t. xxvi, f. 3; Günther, Catal. i, p. 118, and in Garretts. Fische d. Sudsee, Heft. i, p. 5, pl. v; Klunz. Fische d. Roth. Meer. verh. z. b. Ges. Wien. 1870, p. 679.

Serranus guttatus, Cuv. and Val. ii, p. 357.

Diacope miniata, Cuv. and Val. ii, p. 433.

Cromileptes miniatus, Swains. Fish. ii, p. 201.

Serranus cyanostigmatoides, Bleeker, Verh. Bat. Gen. xxii, Perc. p. 31; Günther, Catal. i, p. 117.

Epinephelus cyanostigmatoides, Bleeker, Ternate, p. 232, and Atl. Ich. Perc. t. v, f. 3.

Epinephelus argus, Bleeker, Waigiou. p. 296.

Epinephelus miniatus, Bleeker Epinephelini, p. 53.

B. vii, D. $\frac{9}{15-16}$, P. 18, V. 1/5, A. $\frac{3}{9}$, C. 17, L. l. 90, L. r. $\frac{106}{96}$, L. tr. 14-16/40, Cæc. pyl. 12 (Madras)—16 (Andamans).

Length of head from 4/13 to 2/7, of caudal 1/7, height of body 2/7 of the total length. *Eyes*—diameter from 1/5 to 1/6 of length of head, 1 to $1\frac{1}{2}$ diameters from the end of snout, and $\frac{2}{3}$ of a diameter apart. The maxilla reaches to below the posterior third or hind edge of the orbit. Vertical limb of preopercle usually somewhat emarginate above its angle, the whole being finely and evenly serrated, as are also the sub- and interopercles. Opercular spines well developed, the central one being the largest. *Fins*—dorsal spines rather strong, the fourth or fifth somewhat the longest, and equal to one-third the height of the body, the last nearly as high as the first ray: pectoral as long as the head, exclusive of the snout, and longer than the ventral, which reaches three-fourths of the way to the vent: caudal rounded. *Scales*—ctenoid. *Colours*—uniform scarlet: body, cheeks, opercles, dorsal, caudal, and anal fins covered with large blue spots, the size of which equals the extent of from 2 to 5 scales: two blue spots opposite the base of the pectoral. Two dark streaks from the orbit along the snout. The fins darkest at their margins: two rows of large blue spots along the spinous portion of the dorsal, and six or eight over the soft dorsal and the anal: one or two spots near the base of the pectoral, which fin is sometimes spotted all over.

Peters (Wieg. Arch. 1855, p. 235) considered *S. cyanostigma* as identical with this species. Bleeker (Epinephelini), p. 56, observes that though closely allied they appear to be distinct, as the colour is constantly different: the scaling of the snout is not identical, and it has D. $\frac{9}{14-16}$, P. 16-17, C. 19.

Habitat.—Red Sea, seas of India to the Malay Archipelago and beyond. The specimen figured is 9 inches in length.

27. Serranus guttatus, Plate VI, fig. 3.

Bodianus guttatus, Bl. t. 224; Bl. Schn. p. 330; Lacép. iv, p. 296.

Epinephelus argus, Bl. Schn. p. 301.

Cephalopholis argus, Bl. Schn. p. 311, pl. 61.

Serranus hemistictus, Rüpp. Atl. p. 109, t. xxvii, f. 3; Günther, Catal. i, p. 119; Klunzinger, Verh. z. b. Ges. Wien. 1870, p. 680.

Serranus myriaster, Cuv. and Val. ii, p. 365; Rüpp. Atl. p. 107, t. xxvii, f. 1; Richards. Ich. China, p. 233; Less. Voy. Coq. Poiss. pl. 37; Bleeker, Nat Tyds. Ned. Ind. vi, p. 192.

Serranus argus, Cuv. and Val. ii, p. 360; Günther, Catal. i, p. 115; Peters, Berlin. Monats. 1865, p. 103.

Serranus guttatus, Peters, Wieg Arch. 1855, p. 235; Günther, Catal. i, p. 119, and Fische d. Sudsee, p. 5, t. iv; Kner, Voy. Novara, p. 22; Klunz. Fische d. Roth. Meer. l. c. p. 686.

Epinephelus argus, Bleeker, Epinephelini, p. 57.

B. vii, D. $\frac{9}{15-16}$, P. 18, V. 1/5, A. $\frac{3}{8-9}$, C. 17, L. r. $\frac{107}{102}$, L. tr. 21/43, Cæc. pyl. 8.

Length of head 1/3 to 2/7, of caudal 1/5, height of body 1/3 to 2/7 of the total length. *Eyes*—diameter from 1/5 to 2/13 of the length of head, $1\frac{1}{2}$ diameters from the end of snout, and 1 apart. The maxilla reaches to beyond the vertical from the hind edge of the orbit. Preopercle, its vertical limb rounded and finely serrated, lower limb entire: a few serrations on the interopercle. Three well developed opercular spines, the central one being the longest. *Teeth*—rather small canines in both jaws, the outer row of teeth in the maxilla and the inner in the mandible are larger than the villiform bands. *Fins*—dorsal spines rather strong, increasing in length to the fourth and fifth, which equal about one-third the height of the body: pectoral rather longer than the ventral: second anal spine strongest and slightly longer than the third: soft portions of the dorsal and anal fins angularly rounded: caudal rounded. *Scales*—ctenoid. *Colours*—usually reddish-brown and mostly with darker vertical bands; head, body, and all the fins (except occasionally the pectoral and ventral) covered with numerous small blue spots: dorsal, anal, and caudal with a fine white border.

In the variety figured, *S. hemistictus*, the cross bands are not seen: the spots on the upper half of the body are very few, and the pectoral has a broad yellow edge.

Habitat.—Red Sea, East coast of Africa, seas of India to the Malay Archipelago, China, Australia, and beyond. The specimen figured is 9 inches in length.

28. Serranus leopardus, Plate VI, fig. 4.

Labrus leopardus, Lacép. iii, p. 517, t. 30, f. 1.
Serranus leopardus, Cuv. and Val. ii, p. 336; Günther, Catal. i, p. 123 and Fische d. Sudsee, p. 4, t. 3, f. B. (excl. synonym. pt.)
Serranus spilurus, Cuv. and Val. vi, p. 433; Bleeker, Flores, p. 322.
Serranus Homfrayi, Day, Proc. Zool. Soc. 1870, p. 678.
Epinephelus zanana, Bleeker, Atl. Ich. Perc. t. x, fig. 2.
Epinephelus leopardus, Bleeker, Epinephelini, p. 61.

B. vii, D. $\frac{9}{13-15}$, P. 17, V. 1/5, A. $\frac{3}{8-9}$, C. 17, L. r. $(\frac{70}{65})\frac{88}{80}$, L. tr. 10/26.

Length of head 2/7, of caudal 1/6, height of body 1/3 of the total length. *Eyes*—high up, diameter largest in the immature, from 1/5 to 1/6 of the length of the head in the adult, from 1 to $1\frac{1}{4}$ diameters from end of snout in the adult and nearly 1 apart. The maxilla reaches to below the hind edge of the orbit. Vertical limb of preopercle rounded and very finely serrated; the serrations extending along its angle but not to the lower limb: interopercle usually with a few fine serrations along its posterior half. *Teeth*—canines in both jaws, the outer row in the maxilla, and the inner in mandible larger than the villiform bands. *Fins*—dorsal spines strong, the fifth the longest but not equalling the length of the rays: soft dorsal and anal rounded: pectoral as long as the head exclusive of the snout: second anal spine the strongest and slightly the longest: caudal rounded. *Scales*—rather strongly ctenoid on the body, 8 rows between the lateral-line and the sixth dorsal spine, they cover the snout, preorbital and suborbital ring of bones and the posterior half of the maxilla. A badly marked line, very similar to the lateral-line, passes along the scales near the bases of the dorsal and anal fins. *Colours*—vary, red or yellow predominating. The body may be whitish covered with round or oval red spots which are extended over the dorsal, anal, and caudal fins. A dark band passes from the eye to above the upper opercular spine behind which it terminates in a black spot: one or two black bands with or without a white edging may be present over the free portion of the tail: caudal with a white or blue spot at either of its outer angles, and a triangular black band across its last third. This band may be broken up into an oblique mark across either side of the tail, or may even be seen quite white as in the lower one of the figure.

Habitat.—From the Red Sea through those of India to China; the one figured life size, was taken at the Andaman Islands.

29. Serranus Sonnerati, Plate VII, fig. 1.

Perca rubra, Sonnerat.
Serranus Sonnerati, Cuv. and Val. ii, p. 299; Günther, Catal. i, p. 122; Playfair, Fish. Zanz. p. 3, (exc. pl. iii, fig. 1.)
Serranus pachycentron, Cuv. and Val. ii, p. 295.
Serranus erythræus, Cuv. and Val. vi, p. 516; Günther, Catal. i, p. 116; Playfair, Fish. Zanz. p. 2, pl. i, f. 1.
Serranus pachycentrum, Günther, Catal. i, p. 116.
Epinephelus nigripinnis, Bleeker, Atl. Ich. Perc. t. vi, f. 2; and Epinephelini, p. 39; (*? Serranus nigripinnis*, Cuv. and Val. ii, p. 339).
Siggapu cullawah, Tam.

B. vii, D. $\frac{9}{14-15}$, P. 18-19, V. 1/5, A. $\frac{3}{8-9}$, C. 17, Cæc. pyl. 11-12, L. r. $\frac{130-140}{116-120}$, L. tr. 27/40.

Length of head 3/10 to 2/7, of caudal, 2/13 to 1/7, height of body, 4/13 to 2/7 of the total length. *Eyes*—diameter 2/11 to 2/13 of the total length, $1\frac{1}{4}$ to $1\frac{1}{2}$ diameters from the end of snout, and 3/4 of a diameter apart. Profile from the snout to above the eyes rather concave. The maxilla reaches to a slight distance beyond the hind edge of the orbit. Vertical limb of preopercle sometimes slightly oblique above its angle, it is very finely serrated in its whole extent: lower limb with irregular notches, and serrated, occasionally coarsely so: sub- and inter-opercles finely serrated: the two upper opercular spines more developed than the lower. *Teeth*—one or two well developed canines on either side of both jaws, largest in the lower: the outer row of teeth in the maxilla and the inner in the mandibles larger than the villiform bands. *Fins*—dorsal spines moderately strong, increasing in length to the third from whence they continue to very slightly augment in height to the last which equals 2/7 of that of the body, the inter-spinous membrane is slightly emarginate and not lobed, the rayed portion is about one-fourth higher than the spinous, it and the soft part of the anal rounded: pectoral as long as the head behind the front edge or middle of the eye, and rather longer than the ventral: second anal spine the strongest but not quite so long as the third, which nearly equals the third of the dorsal: caudal rounded. *Scales*—cycloid on the head, ctenoid on the body, fine ones are continued for some distance up the bases of the soft dorsal, anal, and caudal fins: fine ones over the snout, sub-orbital and the anterior and lower portion of the preorbital: the hind half of the maxilla sometimes has very fine ones, at other times it is destitute of any. There are 14 or 15 rows of scales between the sixth dorsal spine and the lateral line at its highest point which is below it. There exists a badly marked line, much similar to the lateral line, running along the scales near the bases of the dorsal and anal fins. *Colours*—of a dull lake, with the head and to below the first half of the spinous dorsal fin covered with a net-work of blue lines enclosing spots from one-sixth the diameter of the eye, to spaces larger than it. Some indistinct spots over the whole of the body. Fins of rather darker colour than the body, especially at their edges: caudal with some dull blue or white spots.

The specimen of *Serranus erythræus*, figured in the "Fishes of Zanzibar" is identical with this species as suggested by Bleeker; also Kelaart's skin *a*, p. 116 of *S. pachycentrum*,* which has L. r. $\frac{140}{115}$, L. tr. 22/—, and is the same as the *large specimens* of *S. leopardus* in the British Museum. *S. Sonnerati*, Playfair, Fish. Zanzibar, p. 3, pl. iii, fig. 1, has L. r. $\frac{100}{95}$ and 9 rows of scales between the lateral line and the base of the sixth dorsal spine, it appears to be identical, as already suggested by Bleeker with his *Epinephelus* (*Serranus*) *miltostigma*.

Amongst Sir Walter Elliot's drawings are three of this species showing variations of colour. Jerdon (M. J. L. and Sc. 1851, p. 129) observes that "the intensity of the red varies a good deal, and it is sometimes marked with white spots."

Habitat—East coast of Africa, seas of India to the Malay Archipelago, and beyond. The specimen figured is that of a female 13 inches long captured in February, 1859, at Madras, where it is not uncommon and attains at least 3 feet in length.

30. **Serranus boelang**, Plate VII, fig. 2.

Serranus boelang, Cuv. and Val. ii, p. 308, vii, p. 504; Quoy and Gaim. Voy. Astrol. p. 657, pl. 3, fig. 4; Playfair, Fish. Zanz. p. 2.

Serranus nigrofasciatus, Hombr. and Jacq. Voy. Pol. Sud. Poissons, p. 36, t. 2, f. 1.

? *Merous unicolor*, Liénard, Nat. Hist. Soc. Maur. 1839, p. 31.

Serranus microprion, Bleeker, Amb. ii, p. 552; Günther, Catal. i, p. 116.

Serranus stigmapomus, Rich. Ich. China, p. 232.

Serranus boenack, Günther, Catal. i, p. 112 (not Bloch); Kner, Novara Fische, p. 21.

Epinephelus boelang, Bleeker, Epinephelini, p. 49.

Epinephelus microprion, Bleeker, Atl. Ich. Perc. t. ii, fig. 1, and Epinephelini, p. 47 (? variety).

B. vii, D. $\frac{9}{15-16}$, P. 15, V. 1/5, A. $\frac{3}{8-9}$, C. 17, L. r. $\frac{90}{83}$, L. tr. 18/36 (Cæc. pyl. 6-7, Kner).

Length of head 4/13 to 2/7, of caudal 2/11, height of body nearly 2/7 of the total length. *Eyes*—diameter 1/5 of length of head, $1\frac{1}{4}$ diameters from end of snout, and 2/3 of a diameter apart. The maxilla reaches to some distance behind the posterior edge of the orbit. Preopercle with its vertical limb finely serrated, the serrations being continued along its angle and a short distance on to its horizontal border: fine serrations upon the sub- and inter-opercles. Opercular spines strong especially the central one. *Teeth*—small canines in both jaws, the outer row of teeth in the maxilla, and the inner in the mandible larger than the villiform bands which are comparatively of small size. *Fins*—dorsal spines rather strong and from the third are about equal in length but not so long as the rays: pectoral a little longer than the ventral and equalling the length of the head excluding the snout: second anal spine much the strongest and also the longest, being equal to two-fifths of the height of the body: soft portions of the dorsal and anal angularly rounded: caudal rounded. *Scales*—ctenoid on the body, ten rows between the lateral line and the base of the sixth dorsal spine. *Colours*—purplish, with from eight to nine vertical bands on the body not so wide as the ground colour: when freshly captured, the one over the free portion of the tail is very dark: a dark mark behind the two upper opercular spines, and a blackish edge to the dorsal, which in the soft portion of the anal and the caudal is margined with white.

S. microprion, Bleeker, which may be a variety of this species has blue spots over the head and shoulders.

Habitat—Red Sea, East coast of Africa, through the seas of India to the Malay Archipelago. It does not appear to attain a large size. The one figured, life-size, came from the Andaman Islands.

Genus, 4—Variola, *Swains.*

Pseudoserranus, Klunz.

Branchiostegals seven: pseudobranchiæ. Body oblong, compressed. Eyes lateral of moderate size. Preopercle with its vertical limb feebly serrated, its horizontal one entire. Opercle with three spines. Teeth villiform in the jaws, vomer and palate: canines present, and the inner row of teeth in both jaws moveable: some conical teeth along the rami of the mandibles. Dorsal fin single with nine spines: anal with three: caudal deeply emarginate. Scales small, ctenoid, none on the snout, suborbitals, or maxilla.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Variola louti*, D. $\frac{9}{13-16}$, A. $\frac{3}{8}$, L. r. $\frac{120}{105}$. Vertical limb of preopercle slightly emarginate and finely serrated. Caudal deeply emarginate. Red, with small darker spots on the body and most of the fins, some of which last are edged with yellow. East coast of Africa, Ceylon.

1. **Variola louti**, Plate VII, fig. 3.

Perca louti, Forsk. p. 40.

Bodianus louti, Bl. Schn. p. 332; Lacép. iv, p. 286.

* Valenciennes observes that he had only seen one specimen and that was in the Leyden Museum, 7 French inches long. His especial reason for considering it a new species appears to be the character of the scales which were small and ctenoid. Those on the sides being slightly keeled, forming about 20 horizontal rows. This appearance is more seen in some specimens than in others, and is not peculiar to this species. In 1867, a *Serranus diacanthus* about $18\frac{1}{2}$ inches long, which was not quite fresh, was brought to me at Madras. I had it preserved as a skin and dried rather too rapidly, the result being that all the rows of scales on the body show a well developed keel. I have also seen this appearance caused in fish which have been immersed, from the first, in spirit of too great a strength.

Labrus punctatus, Lacép. iii, p. 431, pl. 17, f. 2.

Serranus louti, Rüpp. Atl. p. 106, pl. 26, f. 2; Günther, Catal. i, p. 101, and Fische d. Sudsee, p. 2, t. i, (not Cuv. and Val.)

Serranus punctulatus, Cuv. and Val. ii, p. 367, ix, p. 435; Bleeker, Sumatra, i. p. 570; Quoy and Gaim. Voy. Astrol. Poissons, p. 654, pl. 3, f. 2.

Serranus phœnistomus, Swains. Fish. ii, p. 201.

Variola longipinna, Swains. Fish. ii, p. 202.

Pseudoserranus louti, Klunz. Fische d. Roth. Meer. Verh. z. b. Ges. Wien. 1870, p. 687.

Variola louti, Bleeker, Epinephelini, p. 11.

B. vii, D. $\frac{9}{13-15}$, P. 18, V. 1/5, A. $\frac{3}{8}$, C. 17, L. r. $\frac{120}{105}$, Vert. 10/14.

Length of head from 2/7 to 1/4, of caudal 2/9, height of body 2/9 of the total length. *Eyes*—diameter 2/9 to 1/5 in the length of head, upwards of $1\frac{1}{2}$ diameters from the end of snout, and 2/3 of a diameter apart. Lower jaw prominent, the maxilla reaches to below the hind edge of the eye. Vertical limb of preopercle with some feeble serrations at its angle, its lower limb, sub- and inter-opercles entire. *Teeth*—strong canines in the upper, and weaker ones in the lower jaw: outer row of teeth in the maxilla, shorter and thicker than the villiform band: some large teeth also present amongst the villiform ones in the mandible. *Fins*—dorsal spines rather weak, the soft portion of the fin, also of the anal, elongated and pointed: pectoral as long as the head without the snout: ventral one-third longer: second anal spine not quite so long as the third; caudal deeply emarginate and with pointed angles. *Scales*—ctenoid about 14 rows between the lateral-line and the base of the first dorsal spine. *Colours*—red with small darker spots everywhere: all the fins red, outer edge of pectoral and soft dorsal yellowish, as is also snout and abdomen. A yellow line along the inner edge of the two lobes of the caudal fin.

Habitat.—From the Red Sea through the seas of India to the Malay Archipelago. The specimen figured is from the collection in the British Museum.

Genus, 5—Anthias, (*Bl. Schn.*) *Cuv. & Val.*

Caprodon, Temm. and Schleg.: *Aylopon*, *Callanthias*, *Paranthias*, and *Elastoma*, Guichemot: *Holanthias*, Günther.

Branchiostegals seven: pseudobranchiæ. Body oblong, rather elongated, and compressed: preorbital of moderate height, entire. Preopercle serrated. Opercle with two spines. Villiform teeth in both jaws, with canines anteriorly, and an outer row of canine-like ones laterally: also villiform on the vomer and palate: if present on the tongue, minute. Dorsal fin single, with from nine to eleven spines: anal with three: pectorals pointed: caudal rather deeply forked: one, or more of the fins, as a rule, having elongated rays. Scales of moderate size, an enlarged row over the nape. Pyloric appendages few.

Geographical distribution, most of the seas of temperate and tropical regions.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Anthias multidens*, D. $\frac{10}{11}$, A. $\frac{3}{8}$, L. l. 52. Rosy, with lateral golden bands on the body, and two on the head. Andamans.

1. Anthias multidens, Plate VII, fig. 4.

Mesoprion multidens, Day, Proc. Zool. Soc. 1870, p. 680.

B. vii, D. $\frac{10}{11}$, P. 16, V. 1/5, A. $\frac{3}{8-9}$, C. 16, L. l. 52, L. r. $\frac{52}{49}$, L. tr. 7/17, Cæc. pyl. 5.

Length of head 4/15, of caudal 1/4, height of body 1/4 of the total length. *Eyes*—diameter 2/7 of length of head, $1\frac{1}{4}$ diameters from end of snout, and 1 apart. The distance between the eye and the angle of the mouth equals three-fourths of the diameter of the orbit. The maxilla reaches to below the first-third of the orbit. Vertical and horizontal limbs of preopercle finely serrated, most coarsely so at its rounded and somewhat produced angle. Opercle with two well developed spines. Seven rows of scales between the eye and the angle of the preopercle. *Teeth*—villiform in the jaws, with a large canine on either side of the premaxillary, and an outer lateral row of canine-like ones in the maxilla: likewise an outer row of canine-like teeth in the lower jaw: villiform ones on the vomer and palate. *Fins*—dorsal spines slender, the fifth the longest, and nearly equal to half the height of the body below it, the last spine upwards of two-thirds of the length of the fifth: pectoral as long as the head, and reaching to above the end of the base of the anal: last dorsal, and anal rays elongated to nearly twice as long as the one preceding each: second anal spine the strongest, the third the longest, and nearly equal to one-third of the length of the head: caudal deeply forked, the upper lobe slightly the longer. *Colours*—rosy, with about six longitudinal yellow bands along the body, and a golden one from the inferior angle of the eye to the snout, and another across the forehead.

Habitat.—Andamans, where it is common, attaining a large size: although the number of spines, rays, scales, and cæcal pylori are the same as in *Anthias oculatus*, Cuv. and Val. the form of the dorsal fin differs, as in this species the spines do not decrease to the last.

Genus, 6—Grammistes (*Artedi*) *Cuvier.*

Pogonoperca, Günther.

Branchiostegals seven: pseudobranchiæ. Body oblong and compressed. Snout short. Opercle and preopercle unserrated, but spinate. Eyes lateral. Teeth villiform in the jaws, vomer, and palatines, no canines: tongue smooth.

A barbel of a more, or less, rudimentary character on the chin. Two dorsal fins, the first with seven spines: anal spineless. Scales minute, adherent, and enveloped in the epidermis. Pyloric appendages few.

Geographical distribution—Red Sea, throughout those of India to the Malay Archipelago, and beyond.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Grammistes Orientalis*, Bl. Schn. D. 7/$\frac{1}{13}$, A. 9-11. Three spinate denticulations on preopercle. Caudal rounded. Deep brown, with from three to seven narrow white longitudinal bands, which anteriorly are continued on to the head. Red Sea, seas of India, Malay Archipelago, and beyond.

1. Grammistes Orientalis. Plate IX, f. 1.

Grammistes Orientalis, Bl. Schn. p. 189: Cuv. and Val. ii, p. 203, pl. 27: Bleeker, Amboina, iv, p. 105; Günther, Catal. i. p. 171; Klunz. Fische. Roth. Meer. Verh. z. b. Ges. Wien. 1870, p. 707; Bleeker, Epinephelini, p. 129.

Perca bilineata, Thunb. Nov. Act. Hol. xiii, p. 142, t. 5.

Bodianus sex-lineatus, Lacép. iv, pp. 285, 302.

Sciæna vittata, Lacép. iv, p. 323.

Perca triacanthus et *pentacanthus*, Lacép. iv, pp. 398, 424.

Centropomus sex-lineatus, Lacép. v, pp. 688, 689.

B. vii, D. 7 | $\frac{1}{13-15}$, P. 16, V. 1/5, A. 9-11, C. 17.

Length of head 2/7 to 1/3, of pectoral 2/11, of caudal 1/5, height of body nearly 1/3 of the total length. *Eyes*—diameter 2/7 to 1/4 of the length of head, 3/4 of a diameter from end of snout, and 1 apart. Body oblong and elongated, sometimes with a slight concavity in the profile above the orbit: lower jaw the longer. The maxilla extends to below the hind edge of the orbit. Vertical limb of preopercle with three spinate denticulations on its border, the upper being the smallest; some indistinct ones along the lower limb. Three spines on opercle. A rudimentary barbel on the lower jaw, which in a fresh specimen, nearly 4 inches long, equalled half the length of the orbit. *Teeth*—villiform in jaws, vomer, and palate. *Fins*—third dorsal spine the longest equalling one-third of the height of the body below it: soft dorsal, anal, and caudal rounded. *Scales*—imbedded in epidermis and usually covered with mucus. *Colours*—of a deep chestnut brown, with three milk-white longitudinal bands, from the head along the body, the inferior ceasing opposite the posterior end of the base of the anal fin. A white median band from the snout to the base of the dorsal fin.

In some specimens there are six or more white longitudinal lines along either side of the body.

Seba figures this fish as *Grammistes*, pl. 27, f. 5.

Habitat—Seas of India, to the Malay Archipelago, and beyond, attaining only a few inches in length. The one figured is from the Andamans, and life size.

Genus, 7—Diploprion, *(Kuhl. and v. Hass.) Cuv. and Val.*

Branchiostegals seven: pseudobranchiæ. Body oblong, compressed. Eyes lateral. Opercle spinate: preopercle with a double edge, the outer of which is denticulated. Teeth villiform in jaws, vomer, and palatines, no canines: tongue smooth. Two dorsal fins, the first with eight spines: anal with two. Scales small, adherent. Pyloric appendages few.

Geographical distribution.—From the seas of India to China and Japan. This fish I have not personally captured in India, nor found it in local Indian collections; those taken have been probably mere stragglers. Dr. Jerdon remarks, "this pretty fish is rare at Madras."—(Madr. Journ. Lit. and Science, 1851, No. 39, p. 129.)

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Diploprion bifasciatum*, D. 8 | 15, A. $\frac{2}{12}$. Yellow with two black vertical bands. Indian seas, Malay Archipelago to Japan.

1. Diploprion bifasciatum, Plate IX, f. 2.

(Kuhl. and v. Hass.) Cuv. and Val. ii, p. 137, pl. 21: Tem. and Schleg. Fauna Japon. p. 2, pl. 2, f. A.: Richards. Ich. China, p. 221; Bleeker, Verh. Bat. Gen. xxvi, p. 59 and Nat. Tyds. Ned. Ind. vi, 1854, p. 207 and Epinephelini, p. 124; Günther, Catal. i, p. 174; Kner, Novara Fische, p. 29.

Anoovah meen, Tam.

B. vii, D. 8 | 14-15, A. $\frac{2}{11-13}$, C. 17, L. r. $\frac{115}{100-105}$, L. tr. 12/—.

Length of head 2/7, of caudal 1/5, height of body 2/5 of the total length. *Eyes*—diameter 1/4 length of head, $1\frac{1}{4}$ diameters from end of snout, and 3/4 of a diameter apart. The maxilla reaches to below the middle of the orbit. Preopercle having a double edge the outer of which is serrated, the inner ridge is also stated to be sometimes serrated. Approximating portions of sub- and inter-opercles serrated. Opercle with its two upper spines large, followed inferiorly by several smaller ones. *Teeth*—generic. *Fins*—third and fourth dorsal spines the highest, and nearly equal to the length of the head behind the front edge of the orbit; they decrease in length to the last which is very short: anal spines also very short: caudal rounded. *Colours*—Gamboge yellow with two broad black cross bands.

Habitat—Seas of India, to China and Japan.

Sir John Richardson remarks, "specimens exist in every collection of Chinese fishes, and small ones

are common in the insect boxes sold at Canton." The one figured is from a stuffed specimen in the Liverpool Free Museum, kindly lent me for this purpose by its curator, Mr. Moore.

Genus, 8—Lutianus, *Bloch.*

Diacope and *Mesoprion*, Cuv. and Val.: *Genyoroge*, Cantor: *Macolor*, Bleeker: *Proamblys*, *Hypoplites*, *Rhomboplites*, *Ocyurus*, *Evoplites*, and *Tropidinius*, Gill.

Branchiostegals seven: pseudobranchiæ. Body oblong, compressed: snout elongated, with the preorbital rather high and entire. Preopercle serrated, with or without a notch on its vertical border to receive a knob, which is sometimes developed on the interopercle. Opercle rarely with one, more generally with two or three indistinct points. Villiform teeth in both jaws: canines in the upper, with smaller ones in the anterior portion of the lower jaw, and laterally a row of canine-like teeth: villiform teeth likewise on the vomer, and palate: when present on the tongue minute. Dorsal fin single, with from nine to thirteen spines: anal with three: pectorals pointed: caudal rounded, truncated or emarginate. Scales ctenoid, of moderate or rather small size, one or two enlarged rows over the nape. Pyloric appendages few or absent. Air-vessel simple.

Geographical distribution.—From the Red Sea and East coast of Africa through the seas of India, the Malay Archipelago, and to the Pacific.

Uses.—As a rule all these fishes are good as food, though some are insipid: a few attain a large size. They are extensively salted and dried in many localities.

Amongst the *Lutiani* exist variations which require notice. Thus in some, when immature (as observed in a few *Serrani*), a spine exists at the angle of the preopercle: as age advances it is gradually absorbed, although occasionally in the adult coarse serrations may indicate its prior existence. Instead of one there may be several spinate denticulations at this spot in the fry, which also disappear, as in the case of the single spine. The interopercular knob, in those species which possess one (=Genus *Diacope*, Cuv. and Val., or *Genyoroge*, Cantor.) appears in two distinct modes—either as well formed from birth with a notch in the vertical border of the preopercle—or else the knob is gradually formed, and as it increases in size it presses against the vertical border of the preopercle causing absorption at the spot above it and thus creates a notch. Respecting the dorsal spines, it has been remarked of the *Serrani* that one ray may occasionally assume the form of a spine, thus changing the specific number (by the addition of one spine and the diminution of one ray) but this seems to be rather rare amongst the Indian *Lutiani* in which, although the spines may be increased, the rays are not usually diminished in number: an increase in the number of the rays is, however, of more frequent occurrence than in the spines.

In colouring there is one subject that requires further examination, and that is the lateral blotch: in those species in which it is present, it is sometimes most decided in the young, but whether it frequently exists in some specimens and is absent in others remains to be solved. That it disappears if the fresh specimen is left soaking in water is evident: that it sometimes is all but lost in those kept in spirit is also apparent, but the similarity of *Lutianus marginatus* without a lateral blotch to specimens in which it is present is so great, that I cannot separate them into distinct species; the same fact has been observed by Bleeker, in *L. Bengalensis* and *Amboinensis*. It is not a little remarkable that this mark is of a deep black colour on the Malabar coast, in *L. marginatus;* but much less apparent in specimens captured on the Coromandel coast, where also those of an identical size without any such blotch are numerous. Age then cannot be the sole cause, which may be sought for in locality and sex (provided they are the same species).

SYNOPSIS OF SPECIES.

1. *Lutianus Sebæ*, D. $\frac{11}{15\text{-}16}$, A. $\frac{3}{9\text{-}11}$, L. r. $\frac{62}{58}$, L. tr. 9/22. Interopercular knob present, no lingual teeth. Scales in oblique rows. Reddish* with three curved black bands. Red Sea, seas of India, to the Malay Archipelago, and beyond.

2. *Lutianus Malabaricus*, D. $\frac{11}{13}$, A. $\frac{3}{9}$, L. r. $\frac{68}{64}$, L. tr. 9/23. No interopercular 'knob. No lingual teeth. Scales in oblique rows above the lateral line. A violet-purple band on the back, along the base of the dorsal fin. Seas of India to the Malay Archipelago.

3. *Lutianus erythropterus*, D. $\frac{11}{13\text{-}14}$, A. $\frac{3}{9}$, L. r. $\frac{70}{60}$, L. tr. 11-12/25. No interopercular knob. No lingual teeth. Scales in oblique rows. Red with marks varying with age. Red Sea, seas of India to the Malay Archipelago, and beyond.

4. *Lutianus dodecacanthus*, D. $\frac{11}{13\text{-}14}$, A. $\frac{3}{9}$, L. r. $\frac{65}{54}$, L. tr. 8/23. No interopercular knob. No lingual teeth. Scales in oblique rows above the lateral-line. Scarlet. Seas of India to the Malay Archipelago.

5. *Lutianus Bengalensis*, D. $\frac{11}{13\text{-}14}$, A. $\frac{3}{8}$, L. r. $\frac{75\text{-}80}{62\text{-}68}$, L. tr. 7-8/18. An interopercular knob. No lingual teeth. Scales in oblique rows above the lateral-line, superiorly reaching to above the front edge of the eye. Four blue bands from the eye along the sides. Red Sea, seas of India to the Malay Archipelago.

6. *Lutianus fulvus*, D. $\frac{11}{13}$, A. $\frac{3}{8}$, L. r. $\frac{72}{61}$, L. tr. 9/21. An interopercular knob. No lingual teeth. Scales in oblique rows above the lateral-line. Yellowish-red. Andamans, Otaheite.

7. *Latianus biguttatus*, D. $\frac{11}{11\text{-}13}$, A. $\frac{3}{8}$, L. r. $\frac{64}{54}$, L. tr. 6/15. A small interopercular knob. Lingual teeth. Scales in oblique rows above the lateral-line. Olive with two milk-white spots on the back. Seas of India, to the Malay Archipelago.

* It is curious that from this as well as from some other species of red *Lutiani*, as *L. erythropterus*, *L. dodecacanthus*, and even *Odontonectes pinjalo*, the body colour has stained the cloth in which my specimens were enveloped whilst in spirit coming from India. In some white carps on the other hand, as *Barbus filamentosus*, and *B. arulius* the fish turns of a bright red after death, whether placed in spirit or skinned and stuffed, this colour being persistent except to incipient putrefaction, soaking in water or weak spirit and bleaching.

8. *Lutianus lineolatus*, D. $\frac{11}{12-13}$, A. $\frac{3}{8-9}$, L. r. $\frac{52}{50}$, L. tr. 6-7/14. No interopercular knob. Lingual teeth. Scales in oblique sinuous rows above the lateral-line. Body horizontally banded. Red Sea, seas of India to the Malay Archipelago.

9. *Lutianus lemniscatus*, D. $\frac{10}{14}$, A. $\frac{3}{8}$, L. l. 56, L. tr. 8/21. A badly developed interopercular knob. Two wide dark horizontal bands from the eye to the caudal fin. Ceylon to the Malay Archipelago.

10. *Lutianus chrysotænia*, D. $\frac{10}{15}$, A. $\frac{3}{9}$, L. r. $\frac{75}{70}$, L. tr. 8/22. No interopercular knob. Lingual teeth. Scales in oblique rows above the lateral-line. Oblique bands from the eye, posteriorly. Nicobars to the Malay Archipelago.

11. *Lutianus rivulatus*, D. $\frac{10}{15}$, A. $\frac{3}{8-9}$, L. r. $\frac{56}{50}$, L. tr. 8/19. An interopercular knob. No lingual teeth. Scales in oblique rows above the lateral-line. Brownish, spotted with blue: a black blotch, having a white front edge on the lateral-line. Red Sea, East coast of Africa, seas of India, to the Malay Archipelago, and beyond.

12. *Lutianus argentimaculatus*, D. $\frac{10}{13-15}$, A. $\frac{3}{8}$, L. r. $\frac{50-54}{40-45}$, L. tr. 7-8/16. A very slight interopercular knob. Lingual teeth. Scales mostly in horizontal rows above lateral-line. Cherry-red, the young with narrow, white, vertical bands. Red Sea, East coast of Africa, seas of India, to the Malay Archipelago and beyond.

13. *Lutianus roseus*, D. $\frac{10}{14}$, A. $\frac{3}{8}$, L. r. $\frac{57}{50}$, L. tr. 7/18. No interopercular knob. Lingual teeth. Scales in horizontal rows. Caudal fin rounded. Reddish-brown. Seas of India to the Malay Archipelago.

14. *Lutianus sillaoo*, D. $\frac{10}{14}$, A. $\frac{3}{8-9}$, L. r. $\frac{48}{42}$, L. tr. 6/15. No interopercular knob. Lingual teeth. Scales in oblique rows above lateral-line. Reddish with varying colours. Seas of India.

15. *Lutianus lioglossus*, D. $\frac{10}{13-14}$, A. $\frac{3}{8-9}$, L. r. $\frac{60}{52}$, L. tr. 6-7/15. A very slight interopercular knob. No lingual teeth. Scales in oblique rows above lateral-line. Roseate shot with gold: a black lateral blotch. Red Sea, seas of India to the Malay Archipelago and beyond.

16. *Lutianus jahngarah*, D. $\frac{10}{14-15}$, A. $\frac{3}{8}$, L. r. $\frac{48}{42}$, L. tr. 6/13. No interopercular knob. No lingual teeth. Scales in horizontal rows. Reddish with varying colours. Seas of India.

17. *Lutianus quinquelineatus*, D. $\frac{10}{13-14}$, A. $\frac{3}{8-9}$, L. r. $\frac{68}{60}$, L. tr. 8/21. No interopercular knob. Lingual teeth. Scales in oblique rows above the lateral-line. About six blue bands from the eye along the body: a black lateral blotch. Red Sea, East coast of Africa, seas of India to the Malay Archipelago and beyond.

18. *Lutianus lunulatus*, D. $\frac{10}{13-14}$, A. $\frac{3}{8-9}$, L. r. $\frac{63}{54}$, L. tr. 7/21. No interopercular knob. Lingual teeth. Scales in oblique rows above the lateral-line. Reddish-crimson, a lunated black band on the caudal fin. Coast of India to the Malay Archipelago.

19. *Lutianus fulviflamma*, D. $\frac{10}{13-14}$, A. $\frac{3}{8}$, L. r. $\frac{56}{50}$, L. tr. 7-8/16. No interopercular knob. Lingual teeth. Scales in oblique rows above the lateral-line. Golden with a black lateral blotch; and in the variety *Russellii* also oblique golden bands from the eye along the body. Red Sea, East coast of Africa, seas of India to the Malay Archipelago and beyond.

20. *Lutianus Johnii*, D. $\frac{10}{13-14}$, A. $\frac{3}{8-9}$, L. r. $\frac{50}{46}$, L. tr. 7/13. A very indistinct interopercular tuberosity. Lingual teeth. Scales in horizontal rows. Golden with a black lateral blotch. Seas of India to the Malay Archipelago and beyond.

21. *Lutianus gibbus*, D. $\frac{10}{14}$, A. $\frac{3}{8-9}$, L. r. $\frac{70}{65}$, L. tr. 8/23. A strong interopercular knob. No lingual teeth. Scales in oblique rows above the lateral-line. Crimson in the adult. In the young a black band covers the end of the dorsal fin, the last half of the free portion of the tail, and the whole of the caudal. Red Sea, Andamans to the Malay Archipelago.

22. *Lutianus bohar*, D. $\frac{10}{14}$, A. $\frac{3}{8}$, L. r. $\frac{62}{52}$, L. tr. 7/18. A small interopercular knob. Lingual teeth. Scales in oblique rows above the lateral-line. Brownish with two milk-white spots, one below the spinous, the other below the soft portion, of the dorsal fin. Red Sea, seas of India to the Malay Archipelago and beyond.

23. *Lutianus marginatus*, D. $\frac{10}{13-14}$, A. $\frac{3}{8}$, L. r. $\frac{58}{46}$, L. tr. 6-7/15. A strong interopercular knob. No lingual teeth. Scales in oblique rows above the lateral-line. Purplish-yellow, fins darker, edged with white. A black lateral blotch may be present, or absent. East coast of Africa, seas of India to the Malay Archipelago.

24. *Lutianus yapilli*, D. $\frac{10}{14}$, A. $\frac{3}{8}$, L. r. $\frac{48}{47}$, L. tr. 6/14. No interopercular knob. Scales in horizontal rows. Caudal fin rounded. Silvery-grey, with yellow bands. Coromandel coast of India.

25. *Lutianus quinquelinearis*, D. $\frac{10}{13-16}$, A. $\frac{3}{8-9}$, L. r. $\frac{65}{60}$, L. tr. 8/19. A strong interopercular knob. No lingual teeth. Scales in oblique rows above the lateral-line. Five blue bands from the eye along the body: a black lateral blotch. Seas of India to the Malay Archipelago.

26. *Lutianus vitta*, D. $\frac{10}{13}$, A. $\frac{3}{8}$, L. r. $\frac{65-70}{55-60}$, L. tr. 8/12. No interopercular knob. Lingual teeth. Scales in oblique sinuous rows above the lateral-line. Yellowish-red with olive stripes. Seas of India to the Malay Archipelago.

27. *Lutianus Madras*, D. $\frac{10}{13-14}$, A. $\frac{3}{8-9}$, L. r. $\frac{65}{52}$, L. tr. 6/16. No interopercular knob. Lingual teeth. Scales in oblique rows above the lateral-line. Roseate with olive or reddish lines following the rows of scales. East coast of Africa, seas of India to the Malay Archipelago.

28. *Lutianus decussatus*, D. $\frac{10}{13-14}$, A. $\frac{3}{8}$, L. r. $\frac{58-60}{52}$, L. tr. 6-7/17. A slight interopercular swelling. No lingual teeth. Scales in oblique rows above the lateral-line. Six blackish longitudinal bands, and six more vertical ones cross them from the back. A black blotch at the base of the caudal fin. Seas of India to the Malay Archipelago and beyond.

1. **Lutianus Sebæ**, Plate IX, fig. 3.

Perca, Seba, iii, pl. 27, f. 2.
Sparus botlavoo champah, Russell, Fish. Vizag. i, p. 77, pl. 99.

Diacope Sebæ, Cuv. and Val. ii, p. 411 ; Klunz. Fische Roth. Meer. Verh. z. b. Ges. Wien. 1870, p. 692.
Diacope Siamensis, Cuv. and Val. vi, p. 524.
Mesoprion Sebæ, Bleeker, Perc. p. 45 ; Kner. Novara Fische. p. 30.
Genyoroge sebæ, Günther, Catal. p. 176.
Lutjanus Sebæ, Bleeker, Siam. p. 173, and Lutjani, p. 53.
Veri-cut-ta-lay, or *Nai-kerruchi*, " smelling like a dog," Tam.

B. vii, D. $\frac{11}{15\text{-}16}$, P. 17, V. 1/5, A. $\frac{3}{9\text{-}11}$, C. 17, L. l. 50-55, L. r. $\frac{62}{58}$, L. tr. 9/22 : Cæc. pyl. 4-5, Vert. 10/14.

Length of head 4/13 to 2/7, of caudal 1/5, height of body 2/5 of the total length. *Eyes*—diameter 2/7 of length of head, $1\frac{1}{3}$ diameters from end of snout, and 2/3 of a diameter apart. The distance from the eye to the upper edge of the maxilla equals one-fourth of the diameter of the orbit. The maxilla reaches to below the middle of the eye. Both the vertical and horizontal limbs of the preopercle serrated, the former having a deep emargination in the adult to receive a well developed interopercular knob which in the young is not so distinct. *Teeth*—canines in the premaxillaries, an outer row of curved canine-like teeth in the jaws : villiform in a Λ-shape in the vomer, and in a band on the palate, none on the tongue. *Fins*—third dorsal spine the longest, rather above half the length of the head, from thence they decrease to the last but one : soft portion of the fin and also of the anal, elevated and pointed, much higher than long at its base. Pectoral nearly as long as the head. Third anal spine somewhat the longest and nearly equal to the post-orbital portion of the head. *Scales*—in oblique rows above the lateral-line and horizontal ones below it : superiorly they reach to above the hind edge of the orbit : caudal emarginate. *Colours*—reddish, a black band passes from before the dorsal fin, through the eye to the snout : a second from the second to the sixth dorsal spines to the ventral fin : a third from the soft dorsal, curving downwards to the lower half of the caudal : ventrals and lower half of anal black.

Bleeker observes that he possesses a very young specimen (35‴ long) in which the soft dorsal and anal are more rounded, and in colour it appears as if it were brownish, traversed by two narrow white bands.

Habitat.—From the Red Sea, and East coast of Africa, through the seas of India to the Malay Archipelago. Longest specimen captured at Madras 8 inches.

2. **Lutianus Malabaricus**, Plate IX, fig. 4.

Sparus Malabaricus, Bl. Schn. p. 278.
Mesoprion Malabaricus, Cuv. and Val. ii, p. 480.
Mesoprion Malabaricus, Bleeker, Sumatra, iii, p. 3, and Günther, Catal. i, p. 204 (not synonym.)
Lutjanus Malabaricus, Bleeker, Atl. Ich. Perc. t. xv, fig. 1, and Lutjani, p. 50 (not synonym.)

B. vii, D. $\frac{11}{13}$, P. 17, V. 1/5, A. $\frac{3}{9}$, C. 17, L. l. 55, L. r. $\frac{68}{64}$, L. tr. 9/23.

Length of head 2/7, of caudal nearly 1/6, height of body 4/11 of the total length. *Eyes*—diameter 1/4 of length of head, $1\frac{1}{2}$ diameters from the end of snout, and 3/4 of a diameter apart. Form of the body not so compressed as in *L. erythropterus*, its width being equal to two-fifths its height : a slight concavity over the orbits : lower jaw the longer : height of preorbital equals 4/5 of diameter of eye. The maxilla reaches to below the first third of the orbit. Preopercle with a very shallow emargination on its vertical border which is finely serrated ; at its angle the serrations become larger, whilst four or five of diminished size exist along the posterior half of the lower limb. *Teeth*—two or three rather strong curved canines on either side of the premaxillaries ; an outer row of curved conical canine-like teeth in either jaw : villiform ones in a Λ-shape on the vomer, a broad band on the palatines, none on the tongue. *Fins*—dorsal spines moderately strong, from the third they are of about equal length but shorter than the rays, the third spine equals about one-third of the length of the head ; the last spine equals one diameter of the orbit : the seventh or eighth ray is the longest, and equals four-fifths of the extent of the base of the fin, soft dorsal and anal both somewhat angularly rounded and of the same height. Pectoral longer than the ventral, almost as long as the head and reaching to above the anal spines : second and third anal spines of about equal strength, the latter slightly the longer and nearly equalling the third of the dorsal fin : the fourth ray is the longest, slightly exceeding the highest in the dorsal fin : caudal slightly emarginate. *Scales*—rows not tortuous, those above the lateral-line oblique, as are also those below it above the level of the lower edge of the orbit, below which they are horizontal : two broad rows over the nape, and eight across the cheek : they extend along the back as far as to a level with the hind edge of the eye. *Colours*—having a roseate tinge in life with narrow oblique yellow streaks above the lateral-line, and longitudinal ones below it : a longitudinal violet-purple band passes from behind the eye along the base of the dorsal fin opposite the end of which it is interrupted by a light band over the commencement of the tail, subsequently it reappears in a lighter form across the middle of the free portion of the tail. Fins reddish, the dorsal and caudal with a fine black edge : anal spines dark grey, those of ventrals white.

Schneider's type specimen is still in good preservation at Berlin, and identical with the one figured which I took (a little over 8 inches in length) off the Meckran coast. It is closely allied to *L. erythropterus* ; but the dorsal spines are much lower, the eye and the colours &c. differ.

Valenciennes remarks that as Bloch received his specimen from the Coromandel coast of India it is difficult to perceive why Schneider gave to it the term *Malabaricus*. The reason is that Tranquebar (from whence it came) and the southern portions of the Coromandel coast were then termed ' Malabar,' and to this day the natives of Madras call those residing to the south ' Malabars.'

Habitat.—Coasts of Sind and India.

3. **Lutianus erythropterus**, Plate X, figs. 1 (young), 2 (adult).

Lutianus erythropterus, Bl. t. 249; Bl. Schn. p. 325 (not Bleeker).
Sparus chirtah, Russell, Fish. Vizag. i, p. 74, pl. 93.
Diacope annularis, Rupp. Atl. p. 91, and N. W. Fische, p. 74, pl. 93; Klunz. Fische Roth. Meer. Verh. z. b. Ges. in Wien. 1870, p. 697.
? *Diacope erythrina*, Rüpp. N. W. Fische, p. 92, t. 25, f. 3; Klunz. Fische Roth. Meer. Verh. z. b. Ges. in Wien. 1870, p. 702.
Diacope sanguinea, (Ehren.) Cuv. and Val. ii, p. 437 (adult).
Mesoprion rubellus, Cuv. and Val. ii, p. 475.
Mesoprion erythropterus, Cuv. and Val. ii, p. 478.
Mesoprion annularis, Cuv. and Val. ii, p. 488, and iii, p. 497: Quoy and Gaim. Voy. Astr. p. 666, pl. 5, fig. 4; Richards. Ich. China, p. 229; Bleeker, Perc. p. 67; Cantor, Catal. p. 14; Günther, Catal. i, p. 204; Kner. Novara Fische, p. 33.
Diacope metallicus, (Kuhl. and v. Hass.) Bleeker, Batav. p. 525.
Mesoprion sanguineus, Bleeker, Perc. p. 48.
Mesoprion erythrinus, Günther, Catal. i, p. 192; Playfair, Proc. Zool. Soc. 1867, p. 849.
Mesoprion chirtah, Day, Proc. Zool. Soc. 1868, p. 150, and 1869, p. 297.
Lutjanus annularis, Bleeker, Obi. p. 240.
Lutjanus chirtah, Bleeker, Atl. Ich. Perc. t. xxiii, fig. 1, and Lutjani, p. 42.
Soosta, Ooriah.

B. vii, D. $\frac{11}{13-14}$, P. 17, V. 1/5, A. $\frac{3}{9}$, C. 17, L. l. 52-55, L. r. $\frac{70}{60}$, L. tr. 11-12/25, Cæc. pyl. 5-6, Vert. 10/14.

Length of head $3\frac{3}{4}$ to $3\frac{1}{2}$, of caudal 1/5 to 1/6, height of body from $2\frac{3}{4}$ to $3\frac{1}{4}$ in the total length. *Eyes*—diameter 1/5 to 1/6 of the length of the head in the adult, but much larger in the young,* $1\frac{1}{2}$ to 2 diameters from end of snout, and $1\frac{1}{4}$ to $1\frac{1}{2}$ apart. Body compressed, dorsal profile more convex than that of the abdomen, and slightly concave about the orbit. The maxilla, in the adult, scarcely reaches to below the front edge of the orbit. Preopercle with a very shallow emargination on its vertical limb which is finely and evenly serrated to above its angle where the serrations become coarser, they extend for a short distance along its horizontal border: sometimes a very small interopercular knob exists. *Teeth*—one or two canines on either side of the premaxillary, an outer row of curved canine-like teeth in either jaw, villiform ones in a triangular patch on the vomer, and in a rather narrow band on the palatines: none on the tongue. *Fins*—dorsal spines of moderate strength increasing in length to the fourth which equals two-fifths to one-third of the height of the body, from it to the last they are slightly lower and sub-equal in length, the soft portion of the fin more angular in the adult than in the young, the seventh to the tenth rays being the highest, half as long again as the fourth spine, and their height equalling the length of the base of the soft portion of the fin. Pectoral reaching as far as the ventral, and equalling the length of the head behind the posterior nostril: ventral spine as long as the fourth of the dorsal fin: second anal spine somewhat the strongest, but not quite so long as the third which equals the third of the dorsal fin: caudal slightly emarginate or cut square in the young. *Scales*—in somewhat tortuous rows going in a direction upwards and backwards, they extend over the base of the dorsal fin reaching highest on the rays, they are equally developed over the bases of the caudal and anal. *Colours*—crimson with orange reflections: a broad blackish band passes from the eye to the commencement of the dorsal spines, and is sometimes slightly apparent along the whole base of the fin: eight to twelve narrow and nearly horizontal black lines exist below the lateral-line, and several more above it, some being the continuations of those which commence below the lateral-line. A black band crosses the back over the free portion of the tail, having a white one before it, and a narrow pink one posterior to it. Pectoral flesh-coloured: ventral either black or stained black in its outer half or two-thirds: dorsal dark grey in some specimens with a nearly black base and a black edge: caudal pink with a narrow black border: anal darkest anteriorly. In *adults* (12 inches) the black lines disappear, and each row of scales has a golden line: a trace exists of the band from the eye to the dorsal fin: whilst that over the free portion of the tail is somewhat indistinct.

Amongst Bloch's typical collection in the Berlin Museum, Professor Peters showed me two of this species, one being young with the distinct colours of the *annularis;* the other more adult. Bleeker considers the *erythropterus* of Bloch to be identical with *L. lineolatus*, and certainly the body and fins in the figure appear more to resemble that species than the present: the head, (especially the eyes,) differs considerably from the *lineolatus*. The type specimens have their original names upon them.

Although Ruppell's figure of *Diacope erythrina* very closely resembles an adult of this species, he states it to have only 10 dorsal spines. Col. Playfair obtained a "fine specimen" now in the British Museum, termed *erythrinus*, which is the adult of this species, but it has 11 dorsal spines, it is nearly 18 inches long, and the eye is $5\frac{1}{2}$ in the length of the head.

In the Berlin Museum is a fine specimen (21 inches in length) of *Diacope sanguinea*, (Ehren.) Cuv. and

* The following are the measurements as to the *size of the eye* compared with the length of the head in specimens of various ages:

At 6	inches	in	length,	$3\frac{1}{4}$	in	the	length of	the head.
„ $8\frac{1}{2}$	„	„	„	$4\frac{1}{2}$	„	„	„	„
„ 12	„	„	„	$5\frac{1}{2}$	„	„	„	„
„ 18	„	„	„	$5\frac{1}{2}$	„	„	„	„
„ 21	„	„	„	1/6	„	„	„	„

Val. type of the species. It appears identical with this fish. Length of head $\frac{1}{4}$, of caudal $\frac{1}{5}$, height of body nearly $\frac{1}{3}$ of the total length. *Eyes*—diameter $5\frac{1}{2}$ in the length of the head, 2 diameters from end of snout, and $1\frac{1}{2}$ apart. *Fins*—fourth and fifth dorsal spines of equal height, and $2\frac{3}{4}$ in the length of the head.

The type specimen of *Mesoprion rubellus*, C. V., in the Paris Museum is a skin from Pondicherry of this species, its scales are L. r. 67, L. tr. 12/25.

Habitat.—Red Sea, East coast of Africa, seas of India to the Malay Archipelago and beyond. It is captured all the year round at Madras, but is most abundant during the cold months when its fry are also about. Fig. 1 is from a specimen 6 inches in length, and represents the immature fish: Fig. 2, or the mature fish is from a specimen a little over 12 inches long. Both are from Madras.

4. **Lutianus dodecacanthus**, Plate X, Fig. 3.

Mesoprion Malabaricus, Bleeker, Sumatra, v, p. 497; Günther, Catal. i, p. 204 (not Bloch, Schn.)
Lutjanus dodecacanthus, Bleeker, Amb. ii, p. 278 and Atl. Ich. Perc. t. xxiv, f. 2.
Mesoprion dodecacanthus, Günther, Catal. i, p. 206.
Lutjanus Malabaricus, Bleeker, Atl. Ich. Perc. t. lxxv, fig. 1 and Lutjani, p. 50 (in part).

B. vii, D. $\frac{11-(12)}{13-14}$, P. 17, V. 1/5, A. $\frac{3}{9}$, C. 17, L. l. 52, L. r. $\frac{65}{54}$, L. tr. 8/23.

Length of head $3\frac{1}{3}$, of caudal 1/5, height of body $3\frac{1}{3}$ of the total length. *Eyes*—diameter 1/4 of length of head, $1\frac{1}{3}$ diameters from end of snout, and nearly 1 apart. Body compressed, profile above the orbit somewhat concave: the distance between the eye and the upper edge of the maxilla equals a little more than one diameter of the orbit. The maxilla extends to beneath the front edge of the orbit. Vertical limb of preopercle having a shallow emargination, the whole being finely serrated superiorly, but more coarsely so at its angle: lower limb finely serrated in its anterior half. A small interopercular knob. *Teeth*—a pair of moderately sized, curved canines in the premaxillaries, and having two smaller intermediate ones: an outer row of curved, canine-like teeth in both jaws, largest in the mandible, especially about its centre: none on the tongue. Villiform ones in a Λ-form on the vomer, and in a band on the palatines. *Fins*—dorsal spines of moderate strength, the fourth and fifth the longest, and equal to $3\frac{1}{3}$ in the height of the body, they gradually decrease to the last, which is only two-thirds as long as the fourth: the soft portion of the dorsal angular, and one-fifth higher than its base is long. Pectoral reaches to above the anal spines, and is as long as the head: ventral just reaches the vent. Second anal spine not quite so long as the third, which equals the longest in the dorsal fin: its soft portion angular, one-fourth higher than the length of its entire base: caudal slightly emarginate. *Scales*—in oblique, straight (not sinuous) rows above the lateral line, and also as low as a level with the eye, below which all are horizontal: twelve rows between the occiput and base of the dorsal fin, and six across the cheeks. *Colours*—uniform scarlet, with a golden line along each row of scales and a nacreous spot across the free portion of the tail just behind the base of the dorsal fin. A narrow black edge to the dorsal, caudal, and anal fins.

This species seems to be identical with Bleeker's: he observes that three of his specimens have twelve dorsal spines, but which appears to be due to the transformation of the first ray into a weak spine.

There are two fine specimens in the British Museum, one about 16 inches in length, wherein the eye is 2 diameters from the end of the snout: the other is 15 inches long, the diameter of the eye 1/4 of the length of the head, and $1\frac{1}{2}$ diameters from the end of the snout.

Habitat.—Seas of India to the Malay Archipelago. The specimen figured is $14\frac{1}{2}$ inches in length and from Madras.

5. **Lutianus Bengalensis**, Plate X, Fig. 4.

? *Sciæna kasmira*, Forsk. p. 46.
Holocentrus Bengalensis, Bloch, t. 246, fig. 2; Bl. Schn. p. 316; Lacép. iv, p. 330.
Perca polyzonias, Forst. Mss. p. 225.
Diacope octolineata, Cuv. and Val. ii, p. 418, vi, p. 526 (in part); Rüppell, Atl. p. 75; Tem. & Schleg. Fauna Japon. p. 12, t. vi, f. 2; Richards. Ich. China, p. 229.
Diacope octovittata, Cuv. and Val. vi, p. 528.
Mesoprion pomacanthus, Bleeker, Amb. p. 407 (in part); Günther, Catal. i, p. 210.
Genyoroge Bengalensis, Günther, Catal. i, p. 178 (in part.)
Genyoroge octovittata, Günther, Catal. i, p. 180.
Evoplites pomacanthus, Gill, Cuban Fish, Proc. Ac. Nat. Sc. Phil. 1862, p. 234.
Genyoroge Amboinensis, Day, Proc. Zool. Soc. 1870, p. 679.
Diacope kasmira, Klunz. Fische d. R. M. Verh. z. b. Ges. Wien, 1870, p. 695.
Lutjanus Bengalensis, Bleeker, Atl. Ich. Perc. t. xxiv, f. 3 and Lutjani, p. 34.
Veri-keechan, Tam.

B. vii, D. $\frac{11}{13-14}$,* P. 16, V. 1/5, A. $\frac{3}{8}$, C. 17, L. l. 48, L. r. $\frac{75-80}{62-68}$, L. tr. 7-8/18, Cæc. pyl. 0.

Length of head from 2/7 to 4/15, of caudal 1/5, height of body 2/7 of the total length. *Eyes*—diameter from 1/4 to 2/9 of the length of head, $1\frac{1}{4}$ diameters from the end of snout, and 3/4 apart. The distance from the eye to the upper border of the maxilla equals half the diameter of the orbit. The maxilla reaches to below the middle of the orbit. Vertical limb of preopercle with a moderately deep notch above its rounded angle,

* Bleeker has found the following amongst specimens of this species: D. $\frac{10}{15-16}$ or 10 | $\frac{1}{14-15}$ or $\frac{11}{14-15}$ or 11 | $\frac{1}{13-14}$.

superiorly it is finely serrated, but very coarsely so at its angle, some serrations are also continued along its lower limb. Interopercular knob distinct. *Teeth*—moderate-sized canines in the premaxillaries, an outer row of curved conical teeth in either jaw: villiform ones in a Λ-form on the vomer, in a band on the palatines, but none on the tongue. *Fins*—dorsal spines rather strong, the fourth the longest and one-fourth higher than the rays: soft portion of the fin rounded, half as high as its base is long. Pectoral as long as the head and reaching to above the anal spines: ventral does not reach the vent. Second anal spine stronger and usually rather longer than the third (it is sometimes slightly shorter), which equals the length of the postorbital portion of the head, anterior rays the highest and as long as the entire base of the fin, its lower edge slightly convex: caudal emarginate. *Scales*—in oblique rows above the lateral-line and in horizontal ones below it: six or eight rows across the cheeks, whilst superiorly they extend as far forwards as to above the front edge of the eye: none on the preorbital, except in large specimens, but I possess one nine inches long that has several rows there. *Colours*—yellowish-brown superiorly becoming yellowish-white inferiorly. Four bright blue black-edged and slightly sinuous bands pass from the orbit across the opercles, the superior to about the ninth dorsal spine, the second to the fourth dorsal ray, the third to behind the last dorsal ray, and the fourth to rather below the centre of the base of the caudal. Fins yellowish, the dorsal with a dark edge and a light outer margin.

Bleeker observes that three species have the upper surface of the head scaled, the vomerine teeth in a Λ-form, a deep preopercular emargination and an edentulous tongue. They are as follows, and may be thus divided for convenience sake :—

Lutianus Bengalensis, D. $\frac{10-12}{13-16}$, L. r. $\frac{80-85}{68-70}$, L. tr. 8-9/20-21, Cæc. pyl. 0.
Lutianus quinquelinearis, D. $\frac{10}{14-16}$, L. r. $\frac{68-70}{55-60}$, L. tr. 6-7/18-19, Cæc. pyl. 5.
Lutianus Amboinensis, D. $\frac{10-11}{14-15}$, L. r. $\frac{65}{53}$, L. tr. 7-8/17-18, Cæc. pyl. ?.

Bennett, Proc. Zool. Soc. 1832, p. 182, briefly describes a fish as *Diacope spilura*, from Ceylon: D. $\frac{11}{12}$, A. $\frac{3}{9}$. Five parallel red lines on either side; the second and third go from the eye, the fourth from the axilla, the fifth from the angle of the mouth: a large black spot before the base of the caudal fin: spinous portion of the dorsal with a black base and outer edge. It is stated to be affined to *D. octolineata*.

Specimens under the name of *Genyoroge notata*, in the British Museum, have D. $\frac{11}{13}$, A. $\frac{3}{8}$, L. r. $\frac{66-70}{64}$, L. tr. 9/. *Eyes*—diameter $3\frac{1}{3}$ in the length of the head, 1 diameter from the end of snout, and 3/4 of a diameter apart. Scales over suborbital, and a few on preorbital. The second anal spine equals half the length of the head. They are coloured as in this species.

Habitat.—Red Sea, seas of India, to the Malay Archipelago, and beyond; it attains at least 10 inches in length.

6. Lutianus fulvus, Plate X, fig. 5.

Perca fulva, Forst. Mss. p. 193.
Holocentrus fulvus, Bl. Schn. p. 318.
Diacope fulva, Cuv. and Val. ii, p. 435.
Genyoroge fulva, Günther, Catal. i, p. 184.

B. vii, D. $\frac{11}{13}$, P. 17, V. 1/5, A. $\frac{3}{8}$, C. 17, L. l. 51, L. r. $\frac{72}{61}$, L. tr. 9/21.

Length of head 2/7, of caudal 2/11, height of body 3/10 of the total length. *Eyes*—diameter $3\frac{2}{3}$ of the length of head, $1\frac{1}{4}$ diameters from the end of snout, and 3/4 of a diameter apart. A considerable rise from the snout to the commencement of the dorsal fin: abdominal profile not so convex as that of the back: thickness of body equal to 4/7 of its height. The maxilla reaches to below the front fourth of the orbit. Vertical limb of preopercle with a very deep emargination and a produced rounded angle, above the notch the limb is serrated, on the angle it becomes almost spinate, whilst a few fine serrations exist on the lower limb. Interopercular knob very well developed in a pyramidal form. *Teeth*—small curved canines in the upper jaw, an outer rather numerous row of canine-like curved teeth in either jaw, villiform ones in a triangular spot on the vomer, in a band on the palatines, none on the tongue. *Fins*—dorsal spines strong, increasing in length to the fourth, which equals that of the postorbital portion of the head. or $2\frac{3}{4}$ in the height of body, from it they decrease to the last, which is scarcely above two-thirds as high: the soft portion of the fin rounded, the height of the rays being equal to about two-thirds of the highest spine. Pectoral as long as the head, reaching to above the anal spines. Second anal spine much the strongest, third slightly the longest, equalling the second of the dorsal fin, height of the longest rays a little more than that of its entire base: caudal emarginate. *Scales*—in oblique rows above the lateral-line and in horizontal ones below it. *Colours*—uniform yellowish-red with a dark spot in the axil: fins yellow: the upper third of the dorsal black with a white margin: caudal also with a black edge and white margin: a dark black mark across the middle of the first third of the anal.

Habitat.—Andamans, Otaheiti. The specimen figured is upwards of 10 inches in length.

7. Lutianus biguttatus, Plate X, fig. 6.

Serranus biguttatus, Cuv. and Val. vi, p. 507; Günther, Catal. i, p. 155.
Mesoprion lineolatus, Bleeker, Perc. p. 46 (not Ruppell.)
Mesoprion Bleekeri, Günther, Catal. i, p. 208.
Lutjanus Bleekeri, Bleeker, Halmah. i, p. 155.
Lutjanus biguttatus, Bleeker, Lutjani, p. 32.

B. vii, D. $\frac{11}{11-13}$, P. 16, V. 1/5, A. $\frac{3}{8}$, C. 17, L. l. 50, L. r. $\frac{64}{51}$, L. tr. 6/15.

Length of head 2/7, of caudal 1/7, height of body 1/4 to 2/9 of the total length. *Eyes*—diameter 3/10 to 2/7 of length of head, 1 diameter from the end of snout, and 3/4 of a diameter apart. Body elongated, its dorsal and abdominal profiles nearly horizontal. The maxilla reaches to below the first third of the orbit: interorbital space flat. Vertical limb of preopercle with a moderately deep emargination to receive a very badly developed interopercular knob, its angle rounded, the whole limb finely serrated, and the lower limb almost entire. Two small sharp points on the opercle. *Teeth*—villiform in the jaws, with a large canine on either side of the premaxillary, between which are two smaller curved canine-like teeth in the outer row, and several more similar ones along the upper jaw: in the lower jaw exists an outer row of curved, canine-like teeth, becoming larger posteriorly: in a triangular spot of villiform ones on the vomer, the base being behind, and from the centre of which a narrow band passes a short way backwards: those on the palatines in a narrow line: an oblong patch on the tongue. *Fins*—spines weak, those of the dorsal increase in length to the third and fourth, which are half as long as the head, from these they decrease to the last: soft portion of the fin, (as is also that of the anal,) rounded and not half so high as the spines, the longest ray equalling two-thirds the length of the base of the fin. Pectoral extends rather beyond the ventral, but hardly to above the anal, it is two-thirds as long as the head: third anal spine rather the longest, equal to the diameter of the orbit but not so long as the rays, anterior anal rays one-third higher than those of the dorsal, last anal ray as short as the spine, lower edge of fin straight: caudal slightly emarginate. *Scales*—in parallel rows below and oblique ones above the lateral line. *Colours*—yellowish-grey superiorly, becoming yellowish-white on the sides and abdomen, a broad black band passes from the eye to the middle of the caudal fin, dividing the dark back from the light sides, and a second band is continued from below the jaws to above the posterior end of the base of the anal, where it becomes indistinct. A white pearly spot exists on the back under the middle of the spinous dorsal, and a second under the commencement of the rayed portion of the fin.

Professor Peters showed me one of this species, nearly 4 inches in length, received from Paris as *Serranus biguttatus*, and I subsequently saw several more of the types in the Paris Museum.

Habitat.—Seas of India to the Malay Archipelago. The type specimen of Cuv. and Val. came from Ceylon, the one figured ($7\frac{1}{2}$ inches in length) I procured at the Andaman islands.

8. Lutianus lineolatus, Plate XI, fig. 1 and 2.

Perca karooi, Russell, Fish. Vizag. ii, p. 19, pl. 125.
Diacope lineolata, Rüpp. Atl. Fische, p. 76, t. 19, f. 3; Klunz. Verh. z. b. Ges. in Wien. 1870, p. 698.
Serranus nouleny, Cuv. and Val. ii, p. 247; Günther, Catal. i, p. 126.
Mesoprion caroui, Cuv. and Val. ii, p. 489; Cantor, Catal. p. 16.
Mesoprion xanthopterygius, Bleeker, Perc. p. 46.
Mesoprion lineolata, Bleeker, Perc. p. 46 (not syn.); Günther, Catal. i, p. 205; Kner. Novara Fische, p. 36; Playfair, Zanz. p. 17.
Mesoprion erythropterus, Bleeker, Perc. 47; Günther, Catal. i, p. 205 (not Bloch.)
Mesoprion dodecathanthoides, Günther, Catal. i, p. 206 (not Bleeker.)
Lutjanus erythropterus, Bleeker, Atl. Ich. Perc. t. xx, fig. 2, and Lutjani, p. 29 (not Bloch.)
Nooleni, Tam.

B. vii, D. $\frac{11}{12-13}$, P. 16, V. 1/5, A. $\frac{3}{8-9}$, C. 17, L. l. 50, L. r. $\frac{52}{50}$, L. tr. 6-7/14, Cæc. pyl. 4.

Length of head 2/7 to 3/11, of caudal 1/6, height of body 2/7 to 4/15 of the total length. *Eyes*—diameter 1/3 to 2/7 of length of head 3/4 of a diameter from end of snout and also apart. The depth of the cheek from the eye to the maxillary bone equals two-thirds of that of the maxillary bone. The maxilla reaches to below the middle of the orbit. Vertical limb of the preopercle with a slightly produced angle and almost horizontal lower limb, its vertical limb finely serrated, more coarsely so at its angle, the serrations being continued along the posterior half of its lower limb: opercle with two points, the lower being the most distinct. No interopercular knob. *Teeth*—canines in the premaxillaries and an outer row of curved canine-like teeth in both jaws: villiform ones in a triangular patch, having a posterior median elongation in the vomer, and in a narrow band on the palatines; an oblong patch widest anteriorly of very fine teeth on the tongue. *Fins*—dorsal spines moderately strong, the third to the fifth being the longest and nearly equal to half the length of the head, from thence they decrease to the last which is about two-thirds of their height and equal to that of the rays. Pectoral pointed, nearly as long as the head, and reaching to above the anal spines: second anal spine the strongest and nearly equal to the length of the third or to the postorbital portion of the head, anal rays one-fourth higher than those of the dorsal fin. *Scales*—in oblique sinuous rows above the lateral-line to opposite the end of the soft dorsal fin where they become horizontal, as are also those below the lateral-line: on the summit of the head the scales extend forwards to above the anterior third of the eye. *Colours*—purplish-red along the back, becoming more yellow below the lateral-line. In the upper third of the body there are oblique and in places sinuous golden lines along each row of scales, whilst below the lateral-line there are bands of dark pink, one passes along the first-third of the lateral-line and for the depth of half a scale below it: next is a golden band, one scale deep, ending on the lateral-line beneath the middle of the soft dorsal: below this is a rather wider reddish band passing from the eye to the lateral-line below the end of the soft dorsal: next follows a yellow band one scale deep going to the middle of the tail. Below this the fish is longitudinally banded with pink and yellow alternately. Fins yellow, with a light band, along the centre of the dorsal.

Jerdon observed, (M. J. L. and Sc. 1851, p. 129) "I am inclined to think that Russell's figure (125

nouleni) is intended for this fish and not for a species of *Mesoprion (? Serranus)* to which Cuvier refers it without however having seen a specimen. His account of the colour corresponds exactly with that of the *nouleni* of Madras. It is a very beautiful fish but one of very soft and flabby texture." The figure of *nouleni* is amongst Sir W. Elliot's drawings (No. 15), and to it Jerdon has attached the name of *Serranus nouleni*. Irrespective of this he sent a specimen to the British Museum where it still exists, and is placed in the catalogue (i, p. 206) as *Mesoprion dodecacanthoides*, *a*. Half-grown; not good state. Madras. Presented by J. C. Jerdon, Esq.

In the unrivalled Paris collection, Cuv. and Val.'s two specimens of *Serranus nouleni*, C. V. still exist and are, as suggested by Jerdon, identical with the species described above.

Bleeker first pointed out that the *lineolata* Rüppell and Russell's *karooi* are identical. I have figured both varieties owing to the great difference I observed in their colouration, the size of the eye, &c. Fig. 1 is from the coast of Sind ($7\frac{1}{2}$ inches in length) and its tints resemble those shown by Rüppell: fig. 2 is from Madras (7 inches long) and its colours are as described by Russell.

In the 'Fishes of Zanzibar,' three varieties are recorded, (1) yellow with pale blue streaks above the lateral-line, and about seven below it: (2) olive-brown with the lines darker blue: (3) violet above, muzzle rosy, the oblique and longitudinal lines yellow. The form, however, with blue streaks has a well-developed interopercular knob, and can hardly be considered as a mere variety of this species.

Habitat.—Red Sea, East coast of Africa, seas of India to the Malay Archipelago. It is very common off Madras.

9. Lutianus lemniscatus.

Serranus lemniscatus, Cuv. and Val. ii, p. 240; Günther, Catal. i. p. 155.
Lutjanus melanotænia, Bleeker, Obi, p. 245, and Atl. Ich. Perc. t. vii, fig. 2, and Lutjani, p. 66.

B. vii, D. $\frac{10}{14}$, P. 17, V. 1/5, A. $\frac{3}{8}$, C. 17, L. l. 56, L. tr. 8/21.

Length of head 3/10, of caudal 4/21, height of body 4/13 of the total length. *Eyes*—diameter 1/4 of length of head, $1\frac{1}{3}$ diameters from end of snout, and 3/4 of a diameter apart. Dorsal profile more convex than that of the abdomen, and slightly concave between the snout and the eye. The maxilla reaches to below the front edge of the eye. Vertical limb of preopercle serrated and with a shallow emargination: interopercle with a badly developed knob. *Teeth*—canines large in the upper jaw. *Fins*—dorsal spines rather strong, increasing in length to the fourth which equals the postorbital length of the head, and a little higher than the rays: pectoral not quite so long as the head: the second and third anal spines of about the same length and equal to the third of the dorsal fin: caudal emarginate. *Scales*—in oblique rows above the lateral-line, and horizontal ones below it. *Colours*—appear to have been dark red or yellow, with a wide brown or black band going from the eye to the centre of the caudal fin, and another less defined and narrow one below it but parallel to it. The above description is from Valenciennes specimen in the Paris Museum, which is in a good state of preservation. It was obtained from Ceylon.

Habitat.—Ceylon to the Malay Archipelago.

10. Lutianus chrysotænia, Plate XI, fig. 3.

Mesoprion chrysotænia, Bleeker, Nat. Tyds. Ned. Ind. ii, 1851, p. 170, and Act. Soc. Ned. Ind. Manado, i, p. 40; Günther, Catal. i, p. 192; Kner. Novara Fische, p. 34.
Lutjanus chrysotænia, Bleeker, Ternate, p. 233, and Atl. Ich. Perc. t. xxiv, fig. 4, and Lutjani, p. 22.

B. vii, D. $\frac{10}{13}$, P. 16, V. 1/5, A. $\frac{3}{9}$, C. 17, L. l. 52, L. r. $\frac{75}{70}$, L. tr. 8/22.

Length of head 2/7, of caudal 1/5, height of body 4/13 to 2/7 of the total length. *Eyes*—diameter 4/15 of length of head, $1\frac{1}{3}$ diameters from end of snout, and 1 apart. Abdominal profile nearly horizontal, that of the dorsal more convex, but from the orbit to the nape it is straight, or slightly concave: snout pointed: jaws of nearly equal length anteriorly: preorbital under the front third of the eye equals three-fourths of the diameter of the orbit in height. The maxilla reaches to below the anterior third of the orbit. Vertical limb of preopercle having a very shallow emargination, its angle rounded but not produced, both limbs finely serrated. No interopercular knob. Opercular points indistinct. *Teeth*—a pair of large curved canines in the premaxillaries, an outer row of curved canine-like teeth in the upper jaw more closely set but smaller than one which is present in the lower jaw: villiform teeth on vomer in a T-form (or a lanceolate patch, Bleeker): in a band on the palate: and in an oblong patch, rather largest anteriorly, on the tongue. *Fins*—dorsal spines weak, increasing in length to the third which equals that of the postorbital portion of the head, from thence they decrease to the last, which is two-thirds in the same distance: soft portion of the fin rounded, the highest ray equals two-fifths of the length of its base and is much lower than the spinous portion. Pectoral pointed, as long as the head, posterior to the hind nostril and reaching to nearly above the anal spines: ventral reaches two-thirds of the distance at the anal: second anal spine strongest but scarcely so long as the third which equals $1\frac{1}{4}$ diameters of the orbit in length, its first rays highest and are as long as the base of the entire fin, its lower edge rounded, caudal emarginate. *Scales*—in oblique rows above the lateral-line, and in horizontal ones below it: nine to ten rows across the cheek. *Colours*—olive-green with a dark band passing from the upper edge of the eye to the end of the spinous dorsal: a second through the upper fourth of the eye to the last few dorsal rays, and a third from the centre of the eye to the upper half of the base of the caudal fin and having a golden band below it, inferior to which is another dark

horizontal band, and the abdomen beneath it golden : a deep black spot in the axil of the pectoral. Fins golden, a light edge along the upper margin of the spinous dorsal and first five or six rays : caudal with a darkish edge. Bleeker gives the colour of the body as greenish, with eight or more yellow shining bands somewhat oblique above the lateral-line and horizontal below it, also some yellow spots on the head.

The specimen I have figured is very different in colouration from Dr. Bleeker's type, but the proportions of the fish are the same, as well as the direction of the bands, which however are darker in colour, and wider. The description I have given is that of my specimen.

In the British Museum there is a very interesting specimen, 4 inches long, taken at Amboina, and received from Mr. Franks, as *Mesoprion chrysotænia*, young. It is of the same colour as the one I have figured, except that it has a black blotch on the lateral-line from the 22nd to the 32nd scale. The proportions are much the same, allowing for size, but lingual teeth are not well discernible, and its scales are as follows, L. r. $\frac{65}{50}$, L. tr. 9/20.

Habitat.—Nicobars, from whence the late Dr. Stoliczka brought the specimen figured ($7\frac{1}{3}$ inches long), to the Malay Archipelago.

11. **Lutianus rivulatus**, Plate XI, fig. 4.

Sparus kallee maee, Russell, Fish. Vizag. i, p. 75, pl. 96.
Diacope rivulata, *cæruleopunctata*, et *alboguttata*, Cuv. and Val. ii, pp. 414, 424, 445, pl. 38.
Mesoprion myriaster, Liénard, Nat. Hist. Soc. Mauritius, 1839, p. 32.
Mesoprion cœruleopunctatus, Bleeker, Perc. p. 169.
Lutjanus cœruleopunctatus, Bleeker, Amb. p. 278.
Genyoroge rivulata et *cœruleopunctata*, Günther, Catal. i, p. 182 ; Day, Fishes of Malabar, pp. 7, 9.
Diacope rivulata, Klunz. Verh. z. b. Ges. in Wien. 1870, p. 694.
Lutjanus rivulatus, Bleeker, Lutjani, p. 81.
Cuttu pirium, Tam.

B. vii, D. $\frac{10}{15}$, P. 17, V. 1/5, A. $\frac{3}{8-9}$, C. 17, L. l. 45-50, L. r. $\frac{56}{50}$, L. tr. 8/19, Cæc. pyl. 5.

Length of head 3/10 to 2/7, of caudal 1/5, height of body 1/3 of the total length. *Eyes*—diameter 2/9 of length of head, $1\frac{1}{3}$ diameter from the end of snout, and rather above 1 apart. The maxilla reaches to below the anterior edge of the orbit. Vertical limb of preopercle finely serrated even in the well-developed notch that is above its angle to receive the interopercular knob : horizontal limb of preopercle more coarsely serrated in its posterior portion than it is on its vertical border. Sub- and inter-opercles entire, the latter have a large triangular tuberosity directed a little upwards and backwards and received into the preopercular notch. Opercle with two flattened points, the lower the larger. In the very young the preopercular notch is badly formed, but as the interopercular knob increases in size, it by pressure causes absorption above it and thus forms a notch in the preopercular border. *Teeth*—one or two curved canines on either side of the premaxillaries, and an external row of curved canine-like teeth in either jaw, villiform ones in a triangular spot on the vomer, a narrow band on the palate, but none on the tongue. *Fins*—dorsal spines strong increasing in length to the third, fourth, and fifth, which are equal to about one-third of the height of the body, but not quite so long as the highest of the dorsal rays, they decrease in length to the last which equals two-thirds the height of the longest one : soft portion of the fin angularly rounded, the ninth to the eleventh rays being the longest. Pectoral as long as the head : ventral reaches the anus. Anal spines strong, especially the second which is slightly longer than the third and equals the highest of the dorsal fin : soft portion of the fin angular and one-third more than that of the dorsal : caudal slightly emarginate. *Scales*—in oblique rows above the lateral-line, and in horizontal ones below it, a strongly serrated shoulder scale, and two rows of broad scales over the nape. *Colours*—(in the *immature*) back olive, with a slate coloured spot in the centre of each scale, thus forming lines passing upwards and backwards ; abdomen greyish with horizontal golden lines crossing the centre of each scale, and vertical dark ones along their bases. Several bright blue lines pass downwards and backwards over the preopercle and opercle, and two larger ones along the snout. A large white blotch on the lateral-line opposite the third to the fifth soft ray, having a wide black edge anteriorly and posteriorly in its upper third. This white mark covers four scales transversely, is one below and three above the lateral-line. Dorsal, slate coloured, superiorly reddish with a narrow white edge : pectoral reddish : ventrals slaty with a dark edge : caudal bluish, tipped with red. Generally vertical bands are more or less distinct. (In the *adult*) as about 15 inches in length, the mark on the lateral-line becomes indistinct, the golden shade is wanting, but the blue spots remain. The white edge to the fins is also usually absent.

Habitat.—Red Sea, East coast of Africa, seas of India to the Malay Archipelago, and beyond.

12. **Lutianus argentimaculatus**, Plate XI, fig. 5.

Sciæna argentimaculata, Forsk. p. 47.
Sciæna argentata, Gmel. Linn. p. 1300.
Perca argentata, Bl. Schn. p. 86.
Alphestes gembra et *sambra*, Bl. Schn. p. 236, t. 51.
Labrus argentatus, Lacép. iii, pp. 426, 467.
Sparus rangoo, Russell, Fish. Vizag. i, p. 74. pl. 94.

Diacope argentimaculata, Cuv. and Val. ii, p. 432; Rüpp. Atl. Fische, p. 71, t. 19, f. 1; Klunz. Verh. z. b. Ges. in Wien. 1870, p. 699.

Mesoprion rangus, Cuv. and Val. ii, p. 482; Day, Fishes of Malabar, p. 10; Kner. Novara Fische, p. 34.

Mesoprion gembra, Cuv. and Val. ii, p. 485; Cantor, Catal. p. 15; Günther, Catal. i, p. 193; Bleeker, Sumatra, iv, p. 246.

Mesoprion tæniops, Cuv. and Val. vi, p. 543.

Mesoprion immaculatus, Bleeker, Perc. p. 45 (not C.V.)

Mesoprion argentimaculatus, Günther, Catal. i, p. 192.

Lutjanus sambra, Bleeker, Ceram. ii, p. 187.

Lutjanus argentimaculatus, Bleeker, Lutjani, p. 84.

Mesoprion sambra, Peters, Monats. Ak. Wiss. Berlin, 1865, p. 111.

Rangoo, Tel.: *To-go-re-dah*, Andam.

B. vii, D. $\frac{10}{13-15}$, P. 16, V. 1/5, A. $\frac{3}{8}$, C. 17, L. l. 45-50, L. r. $\frac{50-54}{40-45}$, L. tr. 7-8/16, Cæc. pyl. 4.

Length of head $3\frac{1}{4}$ to 2/7, of caudal 1/6 to 2/11, height of body 1/3 to 2/7 of the total length. *Eyes*—diameter 1/3 to 1/5 of the length of head, 1 to $1\frac{1}{3}$ diameter from end of snout, and 2/3 to 1 diameter apart. The distance from the eye to the upper edge of the maxilla, equals from a little more to a little less than one diameter of the orbit in height. The maxilla reaches to below the first third or middle of the eye. Vertical limb of preopercle with a very shallow emargination, a rounded angle, and an oblique lower limb, the vertical border very finely serrated, most coarsely so at its angle and especially along its lower limb. A slight swelling on the interopercle. Opercle with two blunt points. *Teeth*—large canines in the premaxillaries; an outer row of canine-like ones in either jaw, those in the mandible being much the largest. Villiform teeth in a lanceolate or Λ-form, which sometimes has a central posterior projection, also in a band on the palate, and in the adult, a large scabrous patch along the centre of the tongue with small ones anterior to it: in the very young the tongue may be found destitute of teeth. *Fins*—dorsal spines not very strong, increasing in length to the third, fourth, and fifth, which are from one-third to two-fifths of the height of the body, from thence they decrease to the last which is two-thirds their height: soft portion of the fin rather angular, its longest ray equalling three-fourths of the length of its base. Pectoral nearly as long as the head, and reaching to above the anal spines: ventral nearly reaches the vent. Second anal spine the strongest and about equal in length to the third or nearly to the sixth of the dorsal: its soft portion angular, one fourth longer than its entire base: caudal emarginate, in some specimens rather deeply lunated. *Scales*—in horizontal rows above the lateral-line, in some specimens (especially young) they are a little sinuous but do not become regularly oblique until under the soft portion of the fin: below the lateral-line they are horizontal. *Colours*—cherry-red, darkest at the bases of the scales. The front edge of the anal fin pinkish-white as is also the first ventral ray. Upper margin of spinous dorsal orange. In some specimens there are dark spots on the dorsal, caudal, and anal fins. The very young have from six to nine narrow, vertical, silvery-white bands, which become more or less lost as age increases.

This species more especially differs from *L. roseus* by the latter having a rounded caudal fin, and from *L. sillaoo* in the latter having a higher spinous dorsal, and the rows of scales above the lateral-line being oblique in their direction. It appears questionable however whether the last is not merely a variety.

Habitat.—From the Red Sea and East coast of Africa, through the seas of India to the Malay Archipelago and beyond. It attains upwards of two feet in length and is good eating.

13. **Lutianus roseus**, Plate XI, fig. 6.

Mesoprion rangus, Cantor, Catal. p. 14 (not C. V.)

B. vii, D. $\frac{10}{14}$, P. 16, V. 1/5, A. $\frac{3}{8}$, C. 17, L. l. 48, L. r. $\frac{54}{50}$, L. tr. 7/18.

Length of head 2/7, of caudal 1/7, height of body 4/13 of the total length. *Eyes*—diameter 2/9 to 1/4 of length of head, $1\frac{1}{3}$ diameter from end of snout, and 1 apart. Height of preorbital equals three-fourths of the length of the eye. The maxilla reaches to below the first third of the orbit. Vertical limb of preopercle emarginate, and having an oblique lower limb, the whole being finely serrated, but most coarsely at its angle and along the lower limb. No tuberosity on the interopercle: sub- and inter-opercles entire: opercle with two obtuse points. *Teeth*—one or two rather large and curved canines on either side of the premaxillaries: an outer row of slightly curved canine-like teeth in both jaws, largest in the lower: a triangular patch of villiform ones on the vomer, without any posterior prolongation, a very narrow band on the palate, and an elongated band of minute ones on the tongue. *Fins*—dorsal spines moderately strong, the fourth the highest, and equal to the length of the postorbital portion of the head; from it they decrease to the last, which is three-fourths as high as the second, the soft portion of the fin rather rounded, as high as four-fifths of the length of its base and equal to the fourth spine. Pectoral as long as the head behind the posterior nostril: ventral reaching nearly two-thirds of the distance to the anal: second anal spine stronger and rather longer than the third and equal to the length of the sixth of the dorsal fin, soft portion of the fin one-fifth higher than that of the dorsal: caudal rounded. *Scales*—in horizontal rows below the lateral-line, and also above it so far as to below the middle of the dorsal spines, where they commence going obliquely to the base of the soft dorsal, but becoming horizontal beyond the base of that fin: 15 rows between the occiput and base of the first dorsal spine. *Colours*—dark reddish-brown, becoming dull cherry-red below the lateral-line: fins with dark edges.

This fish is so like the *L. argentimaculatus*, that had I not seen many specimens, I should have hesitated

separating them further than varieties. It differs in its rounded instead of emarginate tail: in its vomerine teeth: its second anal spine and slightly in its scaling, &c. Cantor's specimen appears to be identical with it. He observes: "according to Russell this fish is not much esteemed. At Pinang and Singapore, where single individuals occur at all seasons, it is of excellent flavour and considered a great acquisition for the table. At Malacca it is plentiful, and in our settlements and in the Straits it is known under the denomination of 'red rock cod.'" He gives D. $\frac{10}{13|15}$, and as growing to 20 inches in length.

Habitat.—Seas of India to the Malay Archipelago. The specimen figured (8 inches long) is from Madras.

14. **Lutianus sillaoo**, Plate XII, fig. 2.

? *Sparus silaoo.* Russell, Fish Vizag. i, p. 78, pl. 100.
Mesoprion rubellus, Day, Fish. Malabar, p. 2, pl. 2, fig. 2 (not C. V.)

B. vii, D. $\frac{10-(11)}{14}$, P. 16, V. 1/5, A. $\frac{3}{8-9}$, C. 17, L. l. 44, L. r. $\frac{48}{42}$, L. tr. 6/15.

Length of head $3\frac{1}{4}$, of caudal 2/11, height of body $3\frac{1}{4}$ of the total length. *Eyes*—diameter $4\frac{3}{4}$ in length of head, $1\frac{1}{3}$ diameter from end of snout, and 1 apart. Upper profile of head slightly concave: the distance from the eye to the maxilla equals rather more than one diameter of the orbit. The maxilla reaches to below the first third of the eye. Vertical limb of preopercle with scarcely any trace of an emargination, angle rounded, and lower limb very oblique: the whole of the vertical limb is very finely serrated with a few coarser serrations at its angle. No trace of an interopercular knob. Opercular points blunt. *Teeth*—a pair of large curved canines in the premaxillaries, an outer row of curved canine-like teeth in both jaws: villiform ones in a Λ-shape on the vomer and in a band on the palate. A long oval patch of teeth along the centre of the tongue, with two more small ones side by side near its tip. *Fins*—dorsal spines weak, the third and fourth of about the same length, nearly as long as the postorbital portion of the head, and two-fifths the height of the body, from thence they decrease to the last, which is only a little above half the height of the fourth: soft portion of the fin angular, and nearly as high as the spines, its longest ray equalling two-thirds of the length of its base. Pectoral as long as the head behind the first nostril, and reaching to above the last anal spine: ventral extending to the vent: second anal spine stronger but not so long as the third, which equals that of the seventh of the dorsal: its soft portion angular, its longest ray equalling the length of the entire base of the fin. Caudal slightly emarginate. *Scales*—the rows above the lateral-line first go rather obliquely towards the dorsal fin, more so under its soft portion: below the lateral-line they are horizontal. There are twelve rows anterior to the dorsal fin, and seven across the cheeks. *Colours*—back greyish-brown, chest orange, abdomen and sides of a light violet, each scale having a white edge. Spinous portion of dorsal greyish, but the soft with a more yellow tinge: pectoral reddish: caudal red with a black edge.

Russell gives 11 dorsal spines, otherwise the fish resembles either this species or the *L. jahngarah.* My reason for considering that I wrongly identified them in the "Fishes of Malabar" is that I find that it is this species which has lingual teeth, and the *L. jahngarah* in which they are deficient, as observed by Russell.

This fish is evidently very closely allied if not a mere variety of, *L. rangus*, but its dorsal spines appear higher, the rows of scales on its back more oblique, its colours differ, and before referring it to that species, further investigations are required. A figure is given for the purpose of drawing attention to it.

Habitat.—Seas of India, attaining at least four feet in length.

15. **Lutianus lioglossus**, Plate XII, fig. 1.

Lutjanus monostigma, Bleeker, Halmaheira, Ned. T. Dierk. I, p. 155 (not Cuv. and Val.)*
Diacope monostigma, Klunz. Fische d. Roth. Meer, Verh. z. b. Ges. Wien. 1870, p. 702.
Mesoprion monostigma, Günther, Fishe d. Sudsee, p. 14, t. xvi.
Lutjanus lioglossus, Bleeker, Lutjani, p. 74.

B. vii, D. $\frac{10}{13-14}$, P. 16, V. 1/5, A. $\frac{3}{8-9}$, C. 17, L. r. $\frac{60}{52}$, L. tr. 6-7/15.

Length of head 2/7, of caudal 2/13, height of body $3\frac{2}{3}$ to 1/4 in the total length. *Eyes*—diameter 2/7 to 2/9 of length of head, $1\frac{1}{2}$ to 2 diameters from end of snout, and 3/4 of a diameter apart. The distance from the eye to the maxilla equals one diameter of the orbit. The maxilla reaches to below the middle of the eye. Vertical limb of preopercle with a very shallow emargination, and serrated in its whole extent: a very obscure interopercular knob. *Teeth*—strong curved canines in the premaxillaries, an outer row of curved canine-like teeth in both jaws, largest in the lower: villiform teeth in a Λ-form in the vomer and a band on the palatines: no lingual teeth. *Fins*—dorsal spines of moderate strength, increasing in length to the fourth, which equals from two-fifths to one-third in the height of the body, the last spine is one-third shorter: soft portion of the fin somewhat rounded and its height rather less than half its length. Pectoral about as long as the head: ventral reaching rather above half the distance to the anal. Anal spines rather short, the third slightly the longest, and equal to three-fourths of the diameter of the orbit in length, soft portion of the fin highest in front, equalling about the length of its base, lower edge straight: caudal emarginate. *Scales*—in oblique rows above the lateral-line and in horizontal ones below it: 12 rows of scales between occiput and first dorsal spine: six or seven rows across the cheeks. *Colours*—roseate, lightest below, with a black blotch on the lateral-line below the first portion of the soft dorsal fin.

* *Mesoprion monostigma.* C. and V.=*Lutianus fulviflamma*, see p. 41. Kelaart's specimen of *Mesoprion rangus*, from Ceylon, has the rows above the L. l. oblique, and L. r. $\frac{62}{59}$, L. tr. 8/.

The small eye, short anal spines, and edentulous tongue divide this species from *fulviflamma*, which it much resembles, whilst its scales L. r. $\frac{60}{52}$ likewise show that it cannot be *L. jahngarah* having L. r. $\frac{48}{42}$.

Habitat.—Red Sea, seas of India to the Malay Archipelago; attaining at least 18 inches in length.

16. Lutianus jahngarah.

Sparus erythrinus, ? Russell, Fish. Vizag. i, p. 72, *Jahngarah*, pl. 90.
Mesoprion sillaoo, Day, Fish. Malabar, p. 12, pl. 11. fig. 1 (not C. V.)
Purrawa, Ooriah.

B. vii, D. $\frac{10}{14-15}$, P. 16, V. 1/5, A. $\frac{3}{8}$, C. 17, L. l. 46, L. r. $\frac{48}{42}$, L. tr. 6/17.

Length of head 2/7, of caudal 1/6, height of body 2/7 of the total length. *Eyes*—diameter 1/5 of length of head, $1\frac{2}{3}$ diameter from end of snout, and 1 apart. Dorsal profile more convex than that of the abdomen. The distance between the eye and the upper edge of the maxilla equals one diameter of the orbit. The maxilla reaches to below the middle of the orbit. Vertical limb of preopercle with a shallow emargination above its rounded angle, which appears continuous with its oblique lower limb; the whole of its vertical limb is finely serrated, but about the angle they increase in size, and along the lower limb are more widely apart. A distinct though small interopercular knob. Opercular points blunt. *Teeth*—a pair of large slightly curved canines in the premaxillaries, an outer row of curved, conical, canine-like teeth in both jaws, those in the lower being the largest: villiform ones in a Λ-shape in the vomer, in a band on the palate but none on the tongue. *Fins*—dorsal spines moderately strong, the third the longest and nearly equal to one-third the height of the body, from it they decrease to the last, which is only half its height; soft portion of the fin rather rounded, not so high as the spinous, and its highest ray equal to two-thirds the length of its base. Pectoral as long as the head behind the front nostril, and not reaching to above the anal spines, the ventral reaches a little above half way to the anal fin. Second anal spine stronger but shorter than the third, which equals the length of the seventh dorsal spine or one diameter of the orbit, soft portion of the fin angularly rounded, central rays the highest and equal the length of its entire base: caudal emarginate, being lobed in its last fourth, the upper being slightly the longer. *Scales*—in almost parallel rows to the dorsal profile both above and below the lateral-line, but becoming a little irregular below the soft dorsal, where they ascend obliquely upwards and backwards, but become horizontal again beyond the end of the fin: seven rows across the cheeks: 11 rows between the occiput and base of dorsal fin. *Colours*—back brownish-red, the base of each scale being darkest, whilst below the lateral-line it becomes of a lake-colour, having a tinge of orange along the lower surface of the body. A blue zig-zag line crosses the preorbital. Spinous portion of dorsal and anal greyish, the soft scarlet tinged with orange: pectorals scarlet: front edge of anal whitish.

This species is evidently closely allied to *L. rangus*, it differs greatly in colours, in wanting lingual teeth, in the number of its scales, the length of its spines, and the size of its eye. *L. lioglossus*, Bleeker, has no lingual teeth, but its scales are oblique above the lateral-line, and much more numerous, being L. r. $\frac{60}{50}$. This species differs from *L. sillaoo* in having a small interopercular knob, its lower spinous dorsal, the direction of its scales above the lateral-line, &c.

Habitat.—Seas of India, attaining two feet or more in length. It is esteemed good eating.

17. Lutianus quinquelineatus, Plate XII, fig. 3.

Holocentrus quinquelineatus, Bloch, iv, p. 84: Lacép. iv, p. 329.
Sparus mungi mapudi, Russell, Fish. Vizag. ii, p. 8, pl. 110.
Mesoprion quinquelineatus, Cuv. and Val. ii, p. 445: Günther, Catal. i, p. 209.
Diacope cæruleolineata, Rüpp. N. W. Fische, p. 93, t. 24, f. 3: Klunz. Verh. z. b. Ges. in Wien, 1870, p. 701.

B. vii, D. $\frac{10}{13-14}$, P. 16, V. 1/5, A. $\frac{3}{8-9}$, C. 17, L. l. 51, L. r. $\frac{68}{60}$, L. tr. 8/21.

Length of head 2/7, of caudal 2/11, height of body 2/7 of the total length. *Eyes*—diameter 2/9 of length of head, $1\frac{1}{3}$ diameter from end of snout, and 3/4 of a diameter apart. Body rather strongly compressed, dorsal profile having a considerable rise from the snout and being somewhat concave above the orbit. The maxilla reaches to below the middle of the orbit. Height of preorbital below the first third of the eye equals three-fourths of the diameter of the orbit. Preopercle with a shallow emargination above its angle, the whole of its vertical limb finely serrated, most coarsely so at its angle, lower limb entire: no interopercular knob: opercle with two very blunt points. *Teeth*—an exceedingly strong curved canine on either side of the premaxillary, and two intermediate small ones, an outer row of curved canine-like teeth in both jaws, largest in the lower: villiform ones in a Λ-shape on the vomer, in a narrow band on the palatines and in an oblong patch along the centre of the tongue. *Fins*—dorsal spines moderately strong, increasing in height to the fourth, which equals the length of the postorbital portion of the head; they subsequently gradually decrease to the last, which is two-thirds the height of the longest; soft portion of the fin rounded, as high as the spinous, and its longest ray equal to two-thirds of the length of its base. Pectoral equals the length of the head behind the posterior nostril: the ventral does not quite reach the anal spines. Second anal spine stronger but not so long as the third, which equals the length of the last dorsal spine, soft portion of the fin one-third higher in front than the last ray, its lower edge rounded: caudal lunated. *Scales*—in oblique rows above the lateral-line and horizontal ones below it: they extend forwards on the back to above the hind edge of the eye: seven rows on the cheeks. *Colours*—a blue band goes from the eye to the base of the last dorsal spine: two from the posterior-superior

angle of the eye coalesce under the sixth dorsal spine and proceed to the middle of the base of the soft dorsal: the fourth, also arising from the eye, goes along the lateral-line and opposite the sixth dorsal spine curves upwards, going to the end of the base of the soft dorsal: the fifth band, which is the broadest, commences just above the middle of the hind edge of the eye and goes to the upper half of the base of the caudal fin: the sixth from the lower edge of the eye to the middle of the base of the caudal. A dark mark exists at the base of the pectoral, a black blotch on the lateral-line below the commencement of the soft dorsal fin.

In the 'Fishes of Zanzibar' it is observed: "*Diacope cæruleo-lineata.* Rüpp. N. W. Fische, p. 93, t. 24, f. 3 [not *M. quinquelineatus*,* Cuv. and Val.]." *Bleeker*, Lutjani, p. 40, observes: *M. quinquelineatus*, C. V. is described from the *Mungi mapidi*, Russell, and has blue lines which superiorly are parallel to the profile of the back and are continued to the base of the caudal. He doubts if Rüppell's fish with the lines going obliquely to the back is the same species.

The specimen of Bloch's, *Lutianus quinquelineatus*, 9 inches long, No. 229, is undoubtedly this species, and differs widely from the figured *quinquelinearis*, the type of which is likewise in existence, both being in a good state of preservation at Berlin.

Habitat.—Red Sea, East coast of Africa, seas of India: the specimen figured is 6 inches in length and from the Andaman Islands.

18. Lutianus lunulatus, Plate XII, fig. 4.

Perca lunulata, Mungo Park, Trans. Linn. Soc. iii, p. 35, pl. 6.

Lutjanus lunulatus, Lacép. iv, p. 213; Bl. Schn. p. 329; Bleeker, Atl. Ich. Perc. t. xvii. f. 1, and Lutjani, p. 64.

Mesoprion lunulatus, Cuv. and Val. ii. p. 477; Bleeker, Sumatra, p. 75.

B. vii, D. $\frac{10}{13-14}$, P. 17, V. 1/5, A. $\frac{3}{8-9}$, C. 19, L. l. 55, L. r. $\frac{63}{54}$, L. tr. 7/21.

Length of head 2/7, of caudal 1/6, height of body 1/3 to 2/7 of the total length. *Eyes*—diameter 1/4 of length of head, $1\frac{1}{3}$ diameters from end of snout, and nearly one apart. The distance from the eye to the upper edge of the maxilla equals three-fourths of the diameter of the orbit. The maxilla reaches to below the first third of the orbit. Vertical limb of preopercle with a shallow emargination and an oblique lower limb, its vertical limb is finely, its angle more coarsely serrated, lower limb entire. No interopercular knob. *Teeth*—large curved canines in the intermaxillaries, an outer row of curved canine-like teeth in both jaws, largest in the lower: villiform ones in a Λ-shaped band on the vomer, a narrow one on the palatines, and a small patch near the anterior end of the tongue. *Fins*—dorsal spines weak, the fourth the longest and nearly equalling the length of the postorbital portion of the head, from it they decrease to the last which is about two-thirds its height: soft portion of the fin rounded, its highest ray equalling one-half the length of its base but not so high as the fourth spine. Pectoral much longer than the ventral, being nearly as long as the head: ventral reaching two-thirds of the distance to the anal. Second anal spine longer and stronger than the third: the anterior rays the highest, equalling the length of the base of the entire fin, its lower edge straight, caudal emarginate. *Scales*—in oblique rows above the lateral-line and in horizontal ones below it: superiorly they extend forwards to nearly above the hind edge of the orbit. *Colours*—reddish-crimson superiorly becoming silvery-white on the abdomen: golden lines along each row of scales: dorsal, caudal, and anal with a black outer edge and an external white margin: a lunated black band at the base of the caudal fin extending along its outer edges to the end of the fin: pectoral and ventrals yellow.

Bleeker places *Diacope bitæniata*, C. V. as a synonym of this species, but the type specimen in the Paris Museum has a distinct and rather well-developed interopercular knob, although the emargination of the preopercle is not very deep. The specimen however is not an adult.

Habitat.—Coast of Sind (where the specimen figured, 10 inches long, was captured) to the Malay Archipelago.

19. Lutianus fulviflamma, Plate XII, fig. 5 and 6.

Sciæna fulviflamma, Forsk. p. 45; Gmel. Lin. p. 1299.

Perca fulviflamma, Bl. Schn. p. 90.

? *Lutjanus notatus*, Bl. Schn. p. 325 (not Bloch).

Centropomus hober, Lacép. iv, p. 255.

Sparus antika doondiawah, Russell, Fish. Vizag. i, p. 76, pl. 98.

Diacope fulviflamma, Rüpp. Atl. Fische, p. 72, t. 19, f. 2, and N. W. Fische, p. 94; Cuv. and Val. ii, p. 423; Klunz. Verh. z. b. Ges. Wien, 1870, p. 700.

Mesoprion unimaculatus, Quoy and Gaim. Zool. Freyc. p. 304; Cuv. and Val. ii, p. 441; Bleeker, Perc. p. 42; Quoy and Gaim. Voy. Astrol. p. 665, pl. 5, f. 3.

Mesoprion aurolineatus, Cuv. and Val. iii, p. 496; Day, Fish. Malabar, p. 14, pl. iii.

Mesoprion Russellii, Bleeker, Verh. Bat. Gen. xxii, Perc. p. 41; Day, Proc. Zool. Soc. 1867, p. 701.

Lutjanus notatus, Bleeker, Ternate, p. 233.

Genyoroge notata, Cantor, Catal. p. 12; Day, Fishes of Malabar, p. 8 (not C. V.)

Mesoprion fulviflamma, Bleeker, Amb. ii, p. 532; Günther, Catal. i, p. 201; Day, Fish. Mal. p. 13; Kner, Novara Fische, p. 35.

* The specimen probably referred to is thus marked in the Catalogue, "*a.* Adult. sine patria. D. $\frac{10}{14}$, A. $\frac{3}{9}$, L. l. 80," and which (omitting the black blotch, which is now imperceptible) I would suggest is *L. chrysotænia*: is such a modification of this species?

Lutjanus Russellii, Bleeker, Atl. Ich. Perc. t. xxii. f. 2, and Lutjani, p. 76.
Lutjanus unimaculatus, Vaillant, Soc. Phil. Paris, May 23rd, 1874.
Lutjanus fulviflamma, Bleeker, Halmah. p. 155, Lutjani, p. 61.
Vella-chemboluy, Mal.; *Shemhara* and *Currumay*, Tam.

B. vii, D. $\frac{10}{13\text{-}14}$, P. 16, V. 1/5, A. $\frac{3}{8}$, C. 17, L. l. 50-54, L. r. $\frac{56}{50\text{-}59}$, L. tr. 7-8/16, Cæc. pyl. 4-6.

Length of head 2/7, of caudal 1/5, height of body 1/3 to 2/7 of the total length. *Eyes*—diameter 2/7 to 1/4 of length of head, 3/4 to $1\frac{1}{4}$ diameters from end of snout, and 3/4 of a diameter apart. Snout rather pointed, the maxilla reaches to below the first third of the orbit: height from the eye to the upper edge of the maxilla equal to two-thirds of the diameter of the orbit. Vertical limb of preopercle with a shallow emargination, its angle rather produced, and its lower limb oblique, the whole being finely serrated, most coarsely so at its angle, whilst the serrations are continued half way along the vertical limb. No interopercular knob: two opercular points. *Teeth*—strong curved canines in the premaxillaries, an outer row of curved, conical, canine-like teeth in both jaws, largest in the lower: villiform teeth in a Λ-shape or T-shape on the vomer, in a band on the palatines, and an oblong patch on the tongue (in the adult) which is widest anteriorly. *Fins*—dorsal spines not very strong, the third of nearly the same height as the fourth and fifth, from whence they gradually decrease, the third is one-third higher than the rays and from two-fifths to half as long as the head: rayed portion rounded, two-thirds as high as its base is long. Pectoral as long as the head behind the front nostril: ventral not reaching the vent. Third anal spine about equal in strength but slightly shorter than the second, which equals one diameter and a quarter of the eye in length, and is of equal length with the first ray, which is twice as long as the last, lower edge of the fin concave: caudal slightly emarginate. *Scales*—in oblique rows above the lateral-line and horizontal ones below it: from six to eight rows on the cheeks: superiorly they extend forwards to above the hind edge of the eye. *Colours*—yellow or rosy along the back, with three or four, in the variety *L. Russellii*,* narrow and brilliant golden bands passing obliquely upwards and backwards from the lateral-line, and three or four similar golden bands below it, the first of which goes from the posterior edge of the orbit to the finger mark: the second from the middle of the opercle to opposite the end of the soft dorsal, where it becomes lost on the lateral-line: the third from below the orbit to the base of the caudal fin: and the fourth from below the base of the pectoral to the base of the anal. A large black blotch exists on the lateral-line opposite the commencement of the soft dorsal fin from the 22nd to the 28th or 31st scales, most of it being below the line and only reaching to one or two scales above it: in the variety *L. Russellii*, however, this mark is mostly above the lateral-line.

The type specimen of *Mesoprion monostigma* at Paris is $3\frac{1}{10}$ inches in length. The eye is a little less than 1/3 of the length of the head, and 1 diameter from the end of the snout. The second anal spine is of nearly the same length as the third and equal to $2\frac{3}{4}$ in the length of the head.†

The *Lutianus fulviflamma* is found in two very distinct varieties: in one there are the yellow lines such as I have described and also figured (in pl. xii, fig. 6), and in this form, *L. Russellii*, the distance from the eye to the snout and the size of the lateral blotch is a little more than we perceive it to be in the typical *L. fulviflamma*, of which I have also given a figure (pl. xii, fig. 5.) The two specimens were $7\frac{1}{2}$ and 10 inches respectively in length, and, examined together, certainly appear to be distinct species: but in comparing a large number of specimens, every intermediate variety in form and colour (except the yellow fillets of the *L. Russellii*) are to be seen.

Habitat.—Red Sea, East coast of Africa, seas of India to the Malay Archipelago, and beyond.

20. Lutianus Johnii, Plate XIII, fig. 1.

Anthias Johnii, Bloch, t. 318; Bloch, Schneid. p. 303.
Lutjanus Johnii, Lacép. iv, p. 235; Bleeker, Lutjani, p. 20; Vaillant, Soc. Phil. de Paris, May, 1874.
Sparus doondiawah, Russell, i, p. 76, pl. 97.
Coius catus, Ham. Buch. pp. 90, 369, pl. 38, f. 30.
Sparus Malabaricus, Shaw, Zool. iv, p. 471.
Serranus pavoninus, (young) Cuv. and Val. vii, p. 443; Günther, Catal. i, p. 126.

* In a specimen of this fish (var. *Russellii*) at $1\frac{1}{10}$ inches long, not only are the vertical and horizontal limbs of the preopercle serrated, but the bone has the appearance of a double edge as seen in *Ambassis* and *Apogon*, having a few serrations upon it. The interopercle is likewise serrated in its last half.

† The following lengths of the 3rd anal spine have been carefully made from 10 specimens:

				Inches.						
L. fulviflamma	(*Russellii*),	Length of	specimen	$5\frac{1}{2}$	:	Length of	anal spine	$2\frac{1}{2}$	in the length of	head.
”	”	”	”	$5\frac{3}{4}$		”	”	$2\frac{1}{5}$	”	”
”	”	”	”	8		”	”	$3\frac{1}{7}$	”	”
”	”	”	”	10		”	”	$2\frac{8}{9}$	”	”
”	”	”	”	16		”	”	$4\frac{1}{5}$	”	”
”	·	”	”	$7\frac{1}{2}$		”	”	$3\frac{2}{3}$	”	”
”	·	”	”	8		”	”	$4\frac{1}{2}$	”	”
”	·	”	”	12		”	”	$4\frac{1}{5}$	”	”
”	·	”	”	13		”	”	$4\frac{4}{19}$	”	”
”	·	”	”	15		”	”	$4\frac{7}{10}$	”	”

Mesoprion Johnii, Cuv. and Val. ii, p. 443; Cantor, Catal. p. 13; Günther, Catal. i, p. 200; Day, Fish. Malabar, p. 11; Kner, Novara Fische, p. 35.

Mesoprion flavipinnis, Cuv. and Val. ii, p. 475.

Mesoprion unimaculatus, Richardson, Ich. China, p. 222 (not Quoy and Gaim.)

Chembolay, Mal.: *Nya-pú-nee*, Burm.

B. vii, D. $\frac{10}{13-14}$, P. 16, V. 1/5, A. $\frac{3}{8-9}$, C. 17, L. l. 48, L. r. $\frac{50}{46}$, L. tr. 7/13, Cæc. pyl. (4 Kner.)

Length of head 4/13 to 2/7, of caudal 1/5 to 2/11, height of body 2/7 of the total length. *Eyes*—diameter 1/4 to 1/5 or even 1/6 in large specimens of the length of head, $1\frac{1}{3}$ to $1\frac{1}{2}$ diameters from the end of snout, and from 3/4 to 1 apart. Dorsal profile more convex than that of the abdomen. Preorbital equals three-fourths of the diameter of the orbit in height. The maxilla reaches to below the first third or middle of the orbit. Vertical limb of preopercle finely serrated, becoming more coarsely so at its angle, which is somewhat produced and rounded, its lower limb with a few serrations and crenulations. A very indistinct tuberosity on the interopercle is sometimes present: opercle with two flat points the lower being the longer. The fry up to about $1\frac{1}{2}$ inches in length have a spine at the angle of the preopercle, which becomes absorbed as age advances, the lower limb of the preopercle is also strongly serrated: in a specimen $2\frac{1}{2}$ inches long the spine remains only in the form of a strong denticulation, whilst there are seven more strong serrations along the lower limb. *Teeth*—curved canines of moderate strength in the premaxillaries, an outer curved row of canine-like teeth in both jaws: villiform ones in a triangular patch or elongated Λ-form on the vomer, in a band on the palatines, and in an elongated patch on the tongue in the adult. *Fins*—dorsal spines strong, increasing in length to the fourth, which is two-fifths of the height of the body, from this spine they decrease to the last, which is about one-fourth shorter, the soft portion of the fin somewhat rounded, its longest rays equal to five-sixths of the length of its base and exceed that of the highest spine. Pectoral nearly as long as the head: ventral reaches the vent: second anal spine usually slightly the longest and strongest, it equals the height of the third spine of the dorsal, the rayed portion rounded and rather higher than that of the dorsal: caudal slightly emarginate. *Scales*—the rows above the lateral-line are parallel with the profile of the back, whilst those below it are horizontal. Scales on the dorsal profile only extend forwards to a level with the hind edge of the orbit. *Colours*—yellowish, lightest on the abdomen, with a large black finger mark, of varying depths of colour, on the lateral-line between the 22nd and 31st scales; age, season, and locality all exercise an influence on this blotch: a dark line is almost invariably present along each row of scales. Fins yellow dashed with red: anal with a light front edge.

In the young the ocellus on the side is larger, in a specimen $2\frac{1}{2}$ inches long it commences on the 19th scale, and is surrounded by a light ring, thus constituting *Serranus pavoninus*, Val., whose single specimen was a little over an inch in length: the observation of its having a strong spine at the angle of the "opercle" is evidently a misprint for "preopercle."

Hamilton Buchanan points out the affinity of *Coius catus* with the *Doondiawah* of Russell as well as with his *Mungi mupudee* (No. 110), also that *Anthias Johnii*, Bloch, is nearly allied. It is readily distinguished from all allied species of *Lutianus*, with lateral blotches, recorded from the seas of India, by its having no oblique rows of scales on the body, all those above the lateral-line being parallel to the back and those below it being horizontal.

The type specimen of *Mesoprion flavipinnis*, C. V. (a skin) belongs to this species, the lateral blotch has been omitted from the short description.

Habitat.—Seas of India, Malay Archipelago and beyond, attaining a foot or more in length. The specimen figured is $6\frac{1}{2}$ inches long and from Madras.

21. Lutianus gibbus, Plate XIII, fig. 2 (adult): 3 (young).

Sciæna gibba. Forsk. p. 46.

Holocentrus boutonensis, Lacép. iv, pp. 331, 367.

Lutjanus gibbus, Bl. Schn. p. 326.

Diacope coccinea, (Ehren.) Cuv. and Val. ii, p. 437; Rüpp. N. W. Fische, p. 91, t. 23, f. 3.

Diacope gibba, Cuv. and Val. ii, p. 438; Klunz. Fische d. Roth. Meer. Verh. z. b. Ges. Wien, 1870, p. 693.

Diacope buttonensis, Cuv. and Val. ii, p. 434, and vi, p. 535.

Diacope borensis, Cuv. and Val. vi, p. 532.

Diacope tica, Less. Voy. Duperr. Poiss. p. 231, pl. 23.

Mesoprion bottonensis, Bleeker, Nat. Tyds. Ned. Ind. ii, p. 170; Kner, Nov. Fische, p. 32, f. 6.

Mesoprion janthinus, Bleeker, l. c. vi, p. 52.

Genyoroge gibba, Günther, Catal. i, p. 180.

Genyoroge bottonensis, Günther, l. c. p. 181.

Gengoroge melanura, Günther, l. c. p. 183.

Mesoprion borensis, Günther, l. c. p. 199.

Mesoprion gibbus, Günther, Fische d. Sudsee, p. 12, t. xii, and xiii, f. A.

B. vii, D. $\frac{10}{14}$, P. 18, V. 1/5, A. $\frac{3}{8-9}$, C. 17, L. l. 50, L. r. $\frac{70}{65}$, L. tr. 8/23, Cæc. pyl. 4-5.

Length of head 3/11, of caudal 1/5, height of body 3/10 of the total length. *Eyes*—diameter

$4\frac{1}{4}$ (in the adult) to $3\frac{1}{3}$ (in the young) in length of head, $1\frac{1}{2}$ diameters from end of snout, and 1 apart. Body compressed, profile above the eyes concave: the distance from the eye to the upper edge of the maxilla equals $1\frac{1}{4}$ diameters of the orbit in height. The maxilla reaches to below the front edge of the orbit. Vertical limb of preopercle with a very deep emargination succeeded by a broad and deep angle, its height forming half of that of the vertical limb, above the notch the serrations are very fine, on the rounded, produced angle they are coarse, and a few are continued along its oblique lower limb. Interopercular knob well developed. *Teeth*—large canines in the premaxillaries, an outer row of curved canine-like teeth in both jaws, the most posterior of those in the upper jaw being directed slightly forwards: villiform teeth in a Λ-form in the vomer, and in a band on the palatines, none on the tongue. *Fins*—the third to the fifth dorsal spines the longest and equal to two-sevenths of the height of the body, posteriorly they gradually decrease, the last being three-fourths of their height: soft portion of the fin rounded in the young, more pointed in the adult, the length of the highest ray being three-fifths of that of its base. Pectoral reaches to nearly above the anal, and is as long as the head behind the posterior nostril: ventral reaches the vent. Second anal spine strongest and slightly the longest, it equals the highest in the dorsal fin: soft portion of the fin angular, the middle rays rather longer than its entire base. Caudal slightly notched in the young, more emarginate in the adult, the upper portion being the longer. *Scales*—go in oblique rows, directly upwards and backwards, above the lateral-line, and in sinuously oblique ones, taking the same course, below the lateral-line: six rows on cheeks: superiorly they extend forwards to above the hind edge of the eye. Free portion of the tail rather higher than long. *Colours*—uniform crimson, dorsal and anal fins having a black edge with a white external margin, and a white tip to the caudal lobes: a dark band along the base of the dorsal and anal fins: pectorals and ventrals yellow, the latter with a dark tip: caudal dark purple. In the *young*—body crimson, with a black band commencing at the end of the dorsal fin, and covering a part of the hind end of the free portion of the tail and the caudal fin, except that it has a white outer edge.

Bleeker suggests whether *Diacope axillaris*, C.V. vi, p. 532, may not be this species, but Cuv. and Val. observe that perhaps it is merely a variety of the *marginata*.

Habitat—Red Sea, Andaman islands to the South Sea, the largest specimen obtained ($11\frac{1}{2}$ inches) is figured as the adult, one of the smaller ones is given (fig. 3) life-size. This fish attains at least 16 inches in length.

22. **Lutianus bohar**, Plate XIII, fig. 4.

Sciæna bohar, Forsk. p. 46, No. 47.
Sparus lepisurus, Lacép. iii, t. 15, f. 2.
Lutjanus bohar, Bl. Schn. p. 325; Bleeker, Lutjani, p. 57.
Diacope bohar, Cuv. and Val. ii, p. 433; Rüpp. Atl. Fische, p. 73, and N. W. Fische, p. 103; Klunz. Verh. z. b. Ges Wien, 1870, p. 699.
Diacope quadriguttata, Cuv. and Val. ii, p. 427, vi, p. 533.
Mesoprion quadriguttatus, Bleeker, Banda, p. 233.
Mesoprion bohar, Günther, Catal. i, p. 190, and Fische d. Sudsee, p. 13, t. xv.

B. vii, D. $\frac{10}{14}$, P. 17, V. 1/5, A. $\frac{3}{8}$, C. 17, L. l. 50, L. r. $\frac{62}{52}$, L. tr. 7/18.

Length of head 2/7, of caudal 2/9, height of body 1/3 of the total length. *Eyes*—diameter 2/7 of length of head, $1\frac{1}{4}$ diameter from end of snout, and also apart. The distance from the eye to the upper edge of the maxilla equals two-thirds of the diameter of the orbit. The maxilla reaches to below the middle of the eye. Vertical margin of the preopercle with a shallow notch, the whole of it serrated, most strongly so at its rounded and slightly produced angle, its lower limb oblique and likewise serrated: interopercle with a very small knob. *Teeth*—a pair of large canines in the premaxillaries, an outer row of conical canine-like teeth in either jaw: villiform ones in a Λ-shape on the vomer, in a band on the palatines, and in one or two long patches on the tongue. *Fins*—dorsal spines of moderate strength, the fourth the longest and equalling the length of the post-orbital portion of the head, last dorsal spine slightly exceeding one diameter of the orbit in length: soft portion of the fin rounded, the highest ray equalling two-thirds of the length of its base. Pectoral reaching to nearly above the anal spines, the ventrals scarcely so far: second anal spine strongest and somewhat the longest, equalling the third of the dorsal: soft portion of the fin rounded and the height of the rays equalling the length of the entire base of the fin, its lower edge straight: caudal somewhat deeply emarginate. *Scales*—in oblique rows above the lateral-line and in horizontal ones below it: on the upper surface of the body they reach to above the hind edge of the orbit. *Colours*—brownish along the back becoming whiter on the sides and below: two milk-white spots along the base of the dorsal fin, the first below the sixth to the eighth spines, the second below the last third of the soft dorsal: first dorsal deep blackish-brown, which is continued along the upper edge of the first half of the soft dorsal: outer edges of caudal and front edge of anal blackish, the latter fin having a narrow white anterior margin: ventral black, with a white outer edge.

Habitat.—From the Red Sea through those of India to the Malay Archipelago and beyond. The specimen figured is 6 inches in length.

23. **Lutianus marginatus**, Plate XIII, fig. 5.

Diacope marginata, Cuv. and Val. ii, p. 425; Peters, Wieg. Arch. 1855, p. 238.
Diacope xanthopus, Cuv. and Val. iii, p. 495.

Diacope axillaris, Cuv. and Val. vi, p. 532.

Mesoprion marginatus, Bleeker, Amboina, 1852, ii, p. 554; Kner, Novara Fische, p. 31; Günther. Fische d. Sudsee, p. 13, t. xiv.

Mesoprion Gaimardi, Bleeker, Act. Soc. Sc. Ind. Neerl. vi, Enum. Pisc. p. 23.

Genyoroge marginata, Günther, Catal. i, p. 181.

Lutjanus marginatus, Bleeker, Halmah, p. 155, and Lutjani, p. 72.

Sungarah, Tam.

B. vii, D. $\frac{10}{13} \frac{}{14}$, P. 16, V. 1/5, A. $\frac{3}{8}$, C. 17, L. l. 50, L. r. $\frac{57}{46}$, L. tr. 6-7/15, Cæc. pyl. (7 Kner.)

Length of head 2/7 to 1/4, of caudal 1/5, height of body 1/3 to 2/7 of the total length. *Eyes*—diameter 2/7 of length of head, $1\frac{1}{4}$ diameters from end of snout, and 2/3 of a diameter apart. The height of the preorbital equals two-thirds of the length of the orbit. The maxilla reaches to below the first third of the orbit. Vertical limb of preopercle finely serrated above its emargination, which is deep and situated in its lower third, angle rounded where the serratures are coarsest, whilst some are continued along its horizontal edge: sub- and inter-opercles entire, the latter having a large tuberosity directed upwards and slightly outwards and which is received into the preopercular notch: opercle with two small points. *Teeth*—moderately strong canines in the premaxillaries, an outer row of curved canine-like teeth in both jaws, a narrow villiform Λ-shaped series in the vomer, and a narrow palatine band: none on the tongue. *Fins*—dorsal spines strong, the fourth the longest and equal to two-fifths the height of the body, from it they gradually decrease in length to the last which equals the length of the orbit, the soft portion of the fin rounded, three-fourths as high as the fourth spine, and its height equal to half the length of its base. Pectoral nearly as long as the head and reaching to above the first anal spine: ventral reaches the vent. Second anal spine the strongest and equal to or rather longer than the third, and as long as the highest in the dorsal fin: soft portion of the fin one-third higher than that of the dorsal: caudal emarginate. *Scales*—in oblique rows above the lateral-line to opposite the end of the dorsal fin where they become horizontal, as they likewise are below the lateral-line; they extend forwards on the back to above the hind edge of the eye. *Colours*—purplish-yellow above the lateral-line and golden below it. Generally no lateral blotch. The colours of the back are continued on to the lower third of the dorsal fin and cease at a dark grey longitudinal band which has a lighter one above it, edged superiorly with black and margined with white: caudal dark purplish-red having a white edge: pectoral, ventral and anal flesh-coloured having a yellowish tint.

On the Malabar coast of India specimens are frequently taken that have a black lateral-blotch: also on the Coromandel coast some few have the lateral-mark faintly developed, but it is more commonly absent. This does not depend upon size or season, but may upon sex or locality: in specimens preserved in spirit the mark is liable to disappear. The one figured is 7 inches long, and from Madras.

Habitat.—East coast of Africa, seas of India to the Malay Archipelago, attaining at least 16 inches in length.

24. **Lutianus yapilli**, Plate XIII, fig. 6.

Sparus yapilli, Russell, Fish. Vizag. i, p. 75, pl. 95.

Mesoprion yapilli, Cuv. and Val. ii, p. 483.

B. vii, D. $\frac{10}{14}$, P. 17, V. 1/5, A. $\frac{3}{8}$, C. 17, L. l. 47, L. r. $\frac{48}{47}$, L. tr. 6/14.

Length of head nearly 1/4, of caudal 1/8, height of body 3/11 of the total length. *Eyes*—diameter 1/6 of length of head, 2 diameters from end of snout, aud $1\frac{1}{4}$ apart. The distance from the eye to the upper edge of the maxilla equals one diameter and a quarter the length of the orbit: lower jaw the longer. The maxilla reaches to below the front edge of the orbit. Vertical limb of preopercle with a very shallow emargination above its rounded angle, the whole of the limb being finely serrated, the serrations becoming a little more coarse and widely separated at its angle and along its horizontal border. Sub- and inter-opercles entire. No interopercular knob. *Teeth*—large canines in the premaxillaries, an outer row of curved canine-like teeth in either jaw: villiform ones in a Λ-form on the vomer, and in a band on the palate. The specimen having had the tongue removed the existence or not of lingual teeth cannot be ascertained. Russell also omits to mention whether it is rough or smooth, a subject which he generally notices. *Fins*—dorsal spines strong, the third being three-quarters the height of the fourth which is nearly half the height of the body, they decrease to the ninth which is only 4/11 of that of the fourth spine: soft portion of the dorsal rounded, its height being rather more than half the length of its base. Pectoral nearly as long as the head: the ventral does not reach half the way to the anal fin. Second anal spine the strongest but not quite so long as the third, which equals the length of the head anterior to the orbits: its soft portion a little higher than long at its base, lower edge rounded. *Scales*—in rows parallel to the back above the lateral-line, and horizontal below it: 7 rows on the cheeks, none on the preorbital: superiorly they extend to above the hind edge of the eye, ten rows between the occiput and the first dorsal spine. *Colours*—silvery-grey on the back becoming yellowish white on the abdomen: longitudinal yellowish bands along each row of scales, which in the dry specimen appear sometimes in the form of occasional black spots: cheeks dashed with purple. Fins yellowish, dorsal, anal, and caudal edged with orange.

The foregoing description is from a single specimen $26\frac{1}{2}$ inches long, stuffed, and in the British Museum, it came from Madras where I was not so fortunate as to meet with the species. Jerdon remarks, in Ichthyological Gleanings in Madras (M. J. L. and Sc. 1851, p. 130) "*Vella kadisay*, Tam. Russell, pl. 95. Not very common, of soft texture." A figure of it exists amongst Sir W. Elliot's drawings.

Habitat.—Coromandel coast of India.

25. Lutianus quinquelinearis, Plate XIV, fig. 1.

Holocentrus quinquelinearis, Bl. iv, p. 84, t. 239.
Grammistes quinquevittatus, Bl. Schn. p. 187.
Diacope octolineata, Cuv. and Val. ii, p. 418 and vi, p. 526, (in part); Richardson, Ich. China, p. 229.
Mesoprion etaape, Less. Voy. Coq. ii, p. 229.
Diacope decemlineata, Cuv. and Val. vi, p. 528.
Mesoprion octolineatus, Bleeker, Perc. p. 40.
Mesoprion pomacanthus, Bleeker, Amb. p. 407 (in part).
Genyoroge Bengalensis, Günther, Catal. i, p. 178 (in part).
Genyoroge grammica, Day, Proc. Zool. Soc. 1870, p. 679 (not Bleeker).
Mesoprion Bengalensis, Kner, Novara Fische, p. 31.
Lutjanus quinquelineatus, Bleeker, Lutjani, p. 37.

B. vii, $\frac{10}{13-16}$, P. 16, V. 1/5, A. $\frac{3}{8-9}$, C. 17, L. l. 56, L. r. $\frac{65}{60}$, L. tr. 8/19, Cæc. pyl. 5.

Length of head 2/7, of caudal 1/6, height of body 3/10 to 2/7 of the total length. *Eyes*—diameter 3/10 to 1/3 of the length of head, about 1 diameter from end of snout, and 3/4 of a diameter apart. Dorsal profile more convex than that of the abdomen, which is nearly horizontal: lower jaw slightly the longer: distance from the eye to the upper edge of the maxilla equals a little more than half the diameter of the orbit. The maxilla reaches to below the first third of the orbit. Vertical limb of preopercle with a very deep emargination and a rounded angle, the whole being serrated, the serrations at the lower angle being coarse, lower limb also serrated. A strong interopercular knob: opercular points indistinct. *Teeth*—a pair of moderate sized curved canines in the premaxillaries, an outer row of curved canine-like teeth in either jaw, those in the upper being the largest: villiform ones in a Λ-form in the vomer, a band on the palatines, but none on the tongue. *Fins*—dorsal spines of moderate strength, increasing in length to the fourth which equals $2\frac{1}{3}$ in the height of the body, from it they slightly decrease to the last which equals one diameter of the orbit in length, the soft portion of the fin rounded, the highest ray equal to half the length of its base. Pectoral not quite so long as the head, second anal spine rather longest and strongest, it equals half the height of the body, the rayed portion highest anteriorly where its rays equal the length of its base, its lower edge rounded: caudal emarginate. *Scales*—in oblique rows above the lateral-line, and in horizontal ones below it, superiorly they extend forward to above the anterior third of the eye: the suborbital ring of bones is more or less scaled, and in adults some are even present on the preorbital. *Colours*—olive-yellow, with a deep black finger-mark on the lateral-line below the last few dorsal spines and the first few rays: some lines above the nape formed by a dark spot on each scale. Five blue bands pass from the eye, the first three from above it to the dorsal fin or its termination, the two next from the middle and lower edge of the eye join on the end of the opercle and pass direct to the middle of the base of the tail: the lowest from the snout is continued past the pectoral fin to the end of the base of the soft anal: fins yellow: caudal with a light tip.

Neither Bloch's specimen* or figure shows any lateral blotch, which according to Bleeker is sometimes absent, all my specimens possess it, and in all that I examined I found 5 cæcal appendages, whereas the *Bengalensis* has none.

Genyoroge notata Günther, has D $\frac{11}{13}$, and 9 rows of scales between the lateral-line and the first dorsal spine, otherwise it resembles the fish described above, and of which I consider it is a variety.

Habitat.—Seas of India to the Malay Archipelago. The specimen figured (6 inches long) is from the Andaman islands, but the species is common at Madras.

26. Lutianus vitta, Plate XIV, fig. 2.

Serranus vitta, Quoy and Gaim. Voy. Frey. p. 315, pl. 58, f. 3; Cuv. and Val. ii, p. 239, vi, p. 505; Richards. Ich. China, p. 234.
Diacope vitta, Temm. and Schleg. Fauna Japon. p. 13, t. 6, fig. 1.
Mesoprion enneacanthus, Bleeker, Perc. p. 40 (D. $\frac{9}{13}$): Günther, Catal. i, p. 209.
Mesoprion phaiotæniatus, Bleeker, Perc. p. 43.
Mesoprion vitta, Bleeker, Perc. p. 44; Günther, Catal. i, p. 207; Kner, Novara Fische, p. 37.
Mesoprion ophuysenii, Bleeker, Sumatra, p. 74.
Lutjanus vitta, Bleeker, Ternate, p. 233 and Lutjani, p. 25.

B. vii, D. $\frac{10}{13}$, P. 16, V. 1/5, A. $\frac{3}{8}$, C. 17, L. l. 50, L. r. $\frac{65-70}{55-60}$, L. tr. 8/12.

Length of head from 2/7 to 3/11, of caudal 1/6, height of body 2/7 of the total length. *Eyes*—diameter 2/7 to 1/4 of length of head, $1\frac{1}{4}$ to $1\frac{1}{2}$ diameter from end of snout, and 2/3 of a diameter apart. Body somewhat compressed, dorsal profile more convex than that of the abdomen, but above the eyes it is somewhat concave. Lower jaw slightly the longer: the maxilla reaches to below the first third of the orbit. Suborbital ring of bones below the front third of the orbit equalling three-fourths of the diameter of the eye in depth. Vertical limb of preopercle with a shallow emargination, its angle slightly rounded but not produced, its lower edge rather oblique, it is finely serrated along both limbs, most coarsely so at its angle: opercle with two small and flat

* Bloch's specimen is $8\frac{7}{10}$ inches long, and in good preservation at Berlin, it is marked thus by Valenciennes, *Holocentrus quinquevittatus*, Bl. t. 239; *Diacope decemlineata*, C.V.

points. Sometimes there is a very indistinct interopercular swelling. *Teeth*—large canines in the premaxillaries, an outer row of curved canine-like teeth in either jaw, villiform ones in a triangular spot on the vomer, which patch may be produced posteriorly in the median line, a similar narrow band on the palatines, and in a band pointed behind rounded anteriorly on the tongue (in a specimen 11 inches long). *Fins*—dorsal spines of moderate strength, the fourth being the longest, and equal to two-thirds of the length of the head, from it they gradually decrease to the last which is two-thirds as high as the first ray, whilst the soft portion is slightly lower than the third spine : pectoral nearly as long as the head : second anal spine a little the strongest, but not quite so long as the third which equals the length of the eye : caudal lunated. *Scales*—in oblique and sinuous rows above the lateral-line as far as the end of the dorsal fin, beyond which as well as below the lateral-line they are horizontal. *Colours*—yellowish-red along the back, becoming rosy below the lateral-line : olive stripes follow each row of scales above the lateral-line and brilliant yellow ones those below it. Fins orange, dorsal, anal, and tips of caudal margined with white. Sometimes, but not invariably (especially at Madras), a broad black band passes from the eye to above the centre of the caudal fin, and in such specimens the olive stripes in the upper third of the body are nearly black.

Habitat.—Seas of India to the Malay Archipelago, and beyond. The specimen figured is 7 inches in length.

27. Lutianus Madras, Plate XIV, fig. 3.

Lutianus lutianus, Bl. t. 245 ; Bl. Schn. p. 324; Bleeker, Lutjani, p. 27, and Atl. Ich. Perc. t. xxxvi, f. 3.

Lutjanus Blochii, Lacép. iv, pp. 178, 210.*

Mesoprion lutjanus, Cuv. and Val. ii, p. 479 ; Kner, Novara Fische, p. 37.

Mesoprion Madras, Cuv. and Val. vii, p. 446 ; Bleeker, Perc. p. 44 ; Günther, Catal. i, p. 200 ; Day, Fish. Malabar, p. 14.

? Lutjanus rangus, Bleeker, Bali, p. 154, Atl. Ich. Perc. t. xxi, fig. 3, Lutjani, p. 59.

B. vii, D. $\frac{10}{13-14}$, P. 16, V. 1/5, A. $\frac{3}{8-9}$, C. 17, L. l. 50, L. r. $\frac{65}{52}$, L. tr. 6/16.

Length of head 2/7, of caudal 1/6, height of body 1/3 to 2/7 of the total length. *Eyes*—diameter 1/3 to 2/7 of length of head, 1 diameter from end of snout, and 2/3 of a diameter apart. The depth of the preorbital equals about half the length of the eye : dorsal profile more convex than that of the abdomen. The maxilla reaches to below the front third of the orbit. Vertical limb of preopercle not emarginate, its angle slightly produced and rounded having an oblique lower limb, the whole being serrated, most coarsely so at its angle : no interopercular knob : opercle with two points, the lower most distinct. *Teeth*—rather large curved canines in the upper jaw, and an outer row of curved canine-like teeth in either jaw : villiform ones on the palate either in a lanceolate patch or else in a triangular spot prolonged posteriorly in the median line : in a band on the palatines, also a patch on the tongue. *Fins*—dorsal spines moderately strong, increasing in length to the fourth, which equals that of the postorbital portion of the head, they subsequently decrease to the last which is rather above half the same length : soft portion of the fin rounded, its height being equal to one-third of the length of its base, and being much lower than the spinous. Pectoral pointed, nearly as long as the head but not reaching to above the anal spines : ventral reaches two-thirds of the distance to the anal spines, the second of which is as strong as the third but slightly shorter, its length not being quite equal to the diameter of the eye ; soft portion of the fin as high in front as it is long at its base, its last ray half the height of its first, lower edge of the fin straight : caudal emarginate. *Scales*—in oblique rows above and horizontal ones below the lateral-line, they extend forwards to between the centre of the orbits. *Colours*—roseate, with oblique line above the lateral-line, but which to below the first four dorsal spines are sinuous, below the lateral-line the sides and abdomen are yellow, with narrow red horizontal bands. One specimen captured December 1869, had a lateral band as seen in *L. vitta*.

Bleeker's figure of *L. rangus* appears to resemble this fish, but the upper surface of the head is said to be scaleless.

Habitat.—From the Seychelles through the Indian seas to the Malay Archipelago, attaining about a foot in length.

28. Lutianus decussatus, Plate XIV, fig. 4.

Mesoprion decussatus, Cuv. and Val. ii, p. 487 ; Bleeker, Perc. p. 43 ; Günther, Catal. i, p. 210 ; Kner, Novara Fische, p. 34.

Mesoprion therapon, Day, Proc. Zool. Soc. 1869, p. 514.

Lutjanus decussatus, Bleeker, Ternate, p. 233, and Lutjani, p. 79.

B. vii, D. $\frac{10}{13-14}$, P. 15, V. 1/5, A. $\frac{3}{8}$, C. 17, L. l. 50-54, L. r. $^{5}\frac{8-6}{52}{}^{0}$, L. tr. 6-7/17, Cæc. pyl. 3.

Length of head 4/15 to 2/7, of caudal 1/6, height of body 1/3 to 2/7 of the total length. *Eyes*—diameter 1/4 to 2/9 of length of head, $1\frac{1}{2}$ diameter from end of snout, and nearly 1 apart. Snout pointed, lips rather thick : depth below the orbit to edge of the upper jaw equal to 1 diameter of the eye. The maxilla reaches

* Lacépède describes his fish, p. 178, as having D. $\frac{6}{13}$, and the general colour white : the back yellowish, and above the lateral-line blue transverse bands, &c., he subsequently, p. 210, considers his fish identical with Bloch's.

to below the front edge of the orbit; jaws of equal length in front. Vertical limb of preopercle with a shallow emargination, having fine serrations which are lost at the angle: a slight interopercular knob. *Teeth*—one or two large curved canines in the premaxillaries, and an external row of curved canine-like teeth in the upper jaw, rather larger ones, less curved and wider apart in the lower jaw: villiform ones in a Λ-shaped band in the vomer, an elongated one on the palatines, but none on the tongue. *Fins*—third to fifth dorsal spines the longest, nearly equal to the length of the postorbital portion of the head and two-fifths the height of the body, posteriorly they decrease to the last: soft portion of the fin rounded and lower than the spinous, its longest ray equal to one half the length of its base. Pectoral as long as the head behind the anterior nostril, or even longer in some specimens: ventral reaches two-thirds of the distance to the anal. Second anal spine the strongest, usually not quite so long as the third which equals one diameter and a quarter of the eye in length, its first rays highest, its lower margin rounded: caudal forked, upper lobe the longer. *Scales*—in oblique rows above the lateral-line, and in horizontal ones below it: they extend forwards to above the hind edge of the orbit: seven or eight rows across the cheeks. *Colours*—whitish, with six longitudinal black bands along the body, and six badly marked short vertical ones in its upper third, descending from the base of the dorsal fin, the crossing of these two sets of bands leaves large uncovered whitish spots of ground colour; a deep black spot at the root of the caudal fin. A white band across the occiput, which is continued on to the preopercle. Fins greyish, anal with a white front edge.

Habitat.—Seas of India to the Malay Archipelago, and beyond. The one figured ($9\frac{1}{2}$ inches long) is from the Andamans, where it is a very common species and readily captured with a bait.

Third group—Priacanthina.

Lower jaw prominent. Cleft of mouth almost vertical. Scales ctenoid, small. Cæcal appendages few.

Genus, 9—PRIACANTHUS, Cuv. and Val.

Branchiostegals six: pseudobranchiæ. Body oblong and somewhat elevated. Eyes large. Lower jaw prominent. Preopercle serrated on both limbs as well as on the angle which is produced into a flattened spine-like point: opercle with a point. Teeth villiform in the jaws, vomer, and palate, none on the tongue. A single dorsal fin, with nine to ten spines; anal with three. Scales small and ctenoid, extended on to the snout.

Geographical distribution.—Tropical seas. They do not appear to be very common in India, none have been seen by me in the fresh state: Russell does not figure any. Amongst Sir Walter Elliot's drawings named by Jerdon are two of this Genus: the first appears to be *P. Blochii*: the second termed *Priacanthus kē-wāie* has D. $\frac{10}{11}$, A. $\frac{3}{11}$, and is of the same shape but of a much lighter colour: the ventral fin is spotted with brown, whilst there are two or more large blackish-brown blotches between the inner rays and the body: the length of the longest figure is $4\frac{1}{5}$ inches.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Priacanthus Blochii.* D. $\frac{10}{13}$, A. $\frac{3}{14}$. Light lake red, the vertical and ventral fins with a narrow black edge. Seas of India to the Malay Archipelago.

1. Priacanthus Blochii, Plate VIII, fig. 2.

Anthias macrophthalmus, Bl. vi, p. 115, t. 319; Bl. Schn. p. 304.
Priacanthus Blochii, Bleeker, Nat. Tyds. Ned. Ind. iv, p. 456; Günther, Catal. i, p. 218.

B. vi, D. $\frac{10}{13-14}$, P. 18, V. 1/5, A. $\frac{3}{14}$, C. 17, L. r. 110-120.

Length of head 3/11, of caudal 2/13, height of body 3/11 of the total length. *Eyes*—large, in the middle of the length of the head, 1/2 a diameter from the end of snout and the same distance from the posterior end of the opercle. Lower jaw strongly prominent. The angle of the preopercle provided with a strong spinate point, it and the vertical as well as the horizontal edges of the preopercle serrated: preorbital also serrated along both its upper and lower borders. The maxilla reaches to almost below the first third of the orbit. *Teeth*—villiform in the jaws, vomer, and palate. *Fins*—dorsal spines of moderate strength, increasing in length to the last, which however is not quite so long as the rays; the first few are roughened anteriorly. Pectoral short, equalling two-fifths of the height of the body: ventral spine serrated on both edges: anal spines serrated anteriorly, the third being the longest: caudal cut square. *Colours*—of a light lake-red, all the vertical as well as the ventral fins having a narrow black border.

Amongst Sir W. Elliot's drawings is one named *Priacanthus? Pasoowa* which appears to be this species from Madras: it wants however the black edge to the fins, which also is very slightly apparent in Bloch's specimen. Jerdon remarks, (M. J. L. and Sc. 1851, p. 131.) "*Priacanthus.* I possess drawings of apparently two species of this genus. The one is entirely of a fine red colour, and was named *Pasuwa*, Tam. The other is reddish above, white on the sides, and the ventral fins spotted with dusky: D. $\frac{10}{11}$, A. $\frac{3}{11}$, it was named *Kewai*."

Habitat.—Red Sea, East coast of Africa, seas of India, to the Malay Archipelago. The figure is from a specimen in the British Museum collection, $8\frac{1}{5}$ inches in length.

Fourth Group—Apogonina.*

Form of body more or less elevated and compressed. Opercles mostly denticulated or armed. Cleft of mouth oblique or even nearly vertical. One or two dorsal fins.

Genus, 10—Ambassis,† (Comm.) *Cuv. and Val.*

Chanda, pt. Ham. Buch.: *Hamiltonia* et *Ambassus*, Swains.: *Bogoda*, *Parambassis*, et *Pseudambassis*, Bleeker.‡

Branchiostegals six: pseudobranchiæ well developed. Body compressed, more or less diaphanous. Lower limb of preopercle with a double serrated edge: opercle without prominent spine. Villiform teeth on jaws, vomer, and palate, sometimes on the tongue: canines rarely present. Two dorsal fins, the first with seven spines, the anal with three: a forwardly directed recumbent spine in front of the base of the dorsal fin. Scales cycloid, of moderate or small size, frequently deciduous. Lateral-line complete, interrupted, incomplete or absent.

Geographical distribution.—From the Red Sea, and East coast of Africa, through the seas of India and Malay Archipelago to North Australia and even beyond. Some are exclusively found in fresh water.

Uses.—Although this genus consists of little bony fishes, which rarely exceed six inches in length, and are generally far less, still they have their economic uses. The poorer classes eat them, they are extensively consumed by the larger fishes, forming much of their sustenance during the dry months of the year, whilst owing to their formation they are easily dried without the employment of salt. Buchanan observes of his genus *Chanda*, which is mostly composed of species of *Ambassis*, that they "are very small, and of little value, although in many places abundant and used in considerable quantities: but as food they are insipid, and filled with small bones, for which defect their size does not compensate." Cantor remarks that the "species of *Apogon* and *Chanda* are of little value as articles of food. At Pinang, they, as well as numerous other small fishes, the daily residue of the market, are used as manure."

Some difficulty exists in ascertaining the species of this genus to which a specimen belongs, and for the following reasons. The comparative length of the second or third dorsal spine to that of the body often differs in accordance with the size of the specimen: and local variations on this point seem to exist. The number of the soft rays is not constant. Scales are distinctly apparent in the adult of species in which they are hardly visible in the very young. The lateral-line is subject to variation. Colours likewise are not constant, but the character least subject to change appears to be the serrations on the sub- and inter-opercles, the preorbital, and around the orbit, but those on the vertical border of the preopercle are inconstant in some species.

SYNOPSIS OF SPECIES.

1. *Ambassis nama.* D. $7/\frac{1}{13\text{-}17}$, A. $\frac{3}{14\text{-}17}$. Blunt serrations along horizontal limb of preopercle and on preorbital. Large curved canines in lower jaw. Yellowish-olive with a dark shoulder mark. Fresh waters of India, Assam, and Burma.

2. *Ambassis ranga.* D. $7/\frac{1}{13\text{-}15}$, A. $\frac{3}{14\text{-}16}$, L. r. 60-70. Vertical limb of preopercle serrated or entire, both edges of its lower limb and preorbital serrated. Golden with vertical bands and black margins to the fins in the young. Fresh waters of India and Burma.

3. *Ambassis baculis.* D. $7/\frac{1}{13}$, A. $\frac{3}{13}$, L. r. 80. Double lower edge of the preopercle serrated, also the preorbital and upper edge of the orbit. No canines. Yellowish-olive with a golden occipital spot. Fresh waters of Bengal to the Punjab and Orissa.

4. *Ambassis Thomassi.* D. $7/\frac{1}{11\text{-}12}$, A. $\frac{3}{9\text{-}10}$, L. l. 35-41. Vertical limb and double lower edge of preopercle and posterior half of interopercle serrated: preorbital also serrated. Silvery, spotted. Malabar coast in fresh water.

5. *Ambassis Commersonii.* D. $7/\frac{1}{10\text{-}11}$, A. $\frac{3}{9\text{-}10}$, L. l. 30-33. Double lower edge of preopercle serrated, interopercle entire: preorbital also serrated. Silvery. Seas of India.

6. *Ambassis nalua.* D. $7/\frac{1}{10\text{-}11}$, A. $\frac{3}{9\text{-}10}$, L. l. 26-27. Double lower edge of preopercle and posterior half of interopercle serrated: preorbital also serrated. Silvery. Fresh waters of India near the coast.

7. *Ambassis interrupta.* D. $7/\frac{1}{10\text{-}11}$, A. $\frac{3}{9\text{-}11}$, L. l. 28. Double lower edge of preopercle serrated: interopercle with a few denticulations at its angle: preorbital serrated. Second dorsal spine high. Lateral line interrupted. A dark band along either caudal lobe. Andamans to the Malay Archipelago.

8. *Ambassis Dayi.* D. $7/\frac{1}{10\text{-}11}$, A. $\frac{3}{10}$, L. l. 30. Snout pointed. Vertical limb of preopercle minutely serrated: its double lower border more coarsely so, also the posterior half of the interopercle and the preorbital. Malabar.

* Bleeker places the *Ambassini* or *Bogodini* distinct from this group of *Apogonini*: Klunzinger has a Family *Ambassoidei* with a group of *Apogonini*, which together equal the above "fourth group."

† *Gu-nas-si*, Mugh.

‡ Bleeker's genera of his Bogodini are as follows:—

1. *Ambassis.* Preorbital serrated: teeth small: scales 30-46: dorsal and anal rays 8-11.

2. *Parambassis.* Preorbital serrated: outer row of teeth in premaxillary enlarged, rather widely separated, and almost developing canines: scales of medium or small size: dorsal and anal rays 9-11.

3. *Pseudambassis.* Strong teeth in premaxillary, dorsal fin 12-14 rays, anal 14-17.

4. *Bogoda.* Preorbital entire. Strong teeth in jaws, but more obtuse and conical, with a slight outward direction: dorsal and anal fins many rayed: scales small.

9. *Ambassis gymnocephalus.* D. $7/\frac{1}{9-10}$, A. $\frac{3}{9-10}$, L. l. 27-29. Double lower edge of preopercle serrated: interopercle entire: preorbital serrated: two rows of scales on suborbitals. Lateral-line interrupted. Silvery, with a burnished lateral band. Seas of India, ascending estuaries and rivers.

10. *Ambassis urotænia.* D. $7/\frac{1}{9-10}$, A. $\frac{3}{9-10}$, L. l. 27-28. Double lower edge of preopercle serrated: interopercle entire: preorbital serrated: one row of scales on the suborbitals. Lateral-line entire. Silvery, with a burnished lateral band. Seychelles, Andamans, to the Malay Archipelago.

Amongst the preceding 10 Indian species, *the interopercle is serrated* in *A. Thomassi*, L. l. 35-41; *A. nalua*, L. l. 27-28; *A. interrupta*, L. l. 28 and an interrupted lateral-line, and *A. Dayi*, L. l. 30. The six which have the *interopercle entire* are, *A. nama* with curved canines: *A. ranga*, L. l. 60-70: *A. baculis*, L. l. 80: *A. Commersonii*, L. l. 30-33: *A. gymnocephalus*, L. l. 27-29, and an interrupted lateral-line, and *A. urotænia*, L. l. 28.

1. **Ambassis nama**, Plate XIV, fig. 5.

Chanda nama, Ham. Buch. Fish. Ganges, pp. 109, 371, pl. 39, f. 37.
Chanda phula et *bogoda*, Ham. Buch. l. c. pp. 111, 371.
Ambassis nama, phula et *bogoda*, Cuv. and Val. ii, pp. 185, 186, 187; Day, Proc. Zool. Soc. 1869, p. 298.
Ambassis oblonga, Cuv. and Val. ii, p. 185; Günther, Catal. i, p. 228.
? *Ambassis Indica*, McClell. Cal. Journ. Nat. Hist. ii, p. 585.
Bogoda nama, Bleeker, Beng. en Hind. p. 89.
Ambassis bogoda, Günther, Catal. i, p. 228.
Mucknee and *Ched-du-ah*, Punj.: *Son-dah*, Assam.: *Pud-da* and *Put-to-lah*, Sind.: *Ak-ku-rati*, Tel.: *Buck-ra* and *Pom-pi-ah*, N. W. Prov.: *Cart-kana* and *Goa-chappi*, Ooriah.

B. vi, D. 7 | $\frac{1}{13-17}$, P. 13, V. 1/5, A. $\frac{3}{14-17}$, C. 17.

Length of head 1/4 to 2/9, of caudal 1/4 to 2/9, height of body from 4/11 to 1/3 of the total length. *Eyes*—diameter about 1/3 of length of head, 2/3 to 3/4 of a diameter from end of snout, and also apart. Body compressed, the dorsal and abdominal profiles equally convex, a considerable rise from the occiput to the base of the first dorsal fin. Lower jaw much longer than the upper. The maxilla reaches to below the anterior third of the orbit. Preorbital with three denticulations along its posterior-superior margin: also a denticulation behind them at the middle of the front edge of the orbit, and another at its posterior-superior angle. Vertical limb of preopercle entire, except near its angle, where there are two or three denticulations which become blunted with age: the double border, very slightly denticulated at its lower edge in the young, often entire. Sub- and inter-opercles entire. *Teeth*—two or three large and crooked canines directed forwards on either side of the symphysis of the lower jaw: an outer and an inner enlarged row in both jaws: fine ones on the vomer and palatines. *Fins*—dorsal spines of moderate strength, a recumbent one anterior to the fin, the second spine the longest (in a few specimens the third) and equal in length to the head behind the anterior edge or middle of the eye, or to about half the height of the body below it, the seventh dorsal spine somewhat longer than the sixth: the spine of the second dorsal as long as the first ray, the rays gradually decrease in height: ventral reaches a little beyond the anus but not so far as the anal fin: the third anal spine the longest and strongest equalling the height of the longest in the dorsal fin: caudal deeply forked, the lobes of equal length. *Scales*—minute, scarcely visible on the head; in young specimens captured from stagnant pieces of water, the mucous often causes the scales to be overlooked. *Lateral-line*—is always indistinct, in some specimens it is entire, in others it ceases after proceeding a short way, or it may even be absent. *Pseudobranchiæ*—well developed. *Colours*—yellowish-olive covered all over with minute black dots which on the shoulder are collected into an oblong patch, having its longest diameter vertical: summit of the head and top of the eyes black. Fins orange, the upper half of the first dorsal deep black: a dark upper edge to the second dorsal: caudal dark with a light outer margin: anal with a black mark over the bases of the spines. In some specimens taken at Hurdah, in Bombay, the caudal was black tipped.

This fish shows considerable local variations, which have caused its being described under more than one name. Buchanan observed of the *phula*, that it is "devoid of scales," "strongly resembles the *nama*, but seldom exceeds two inches," "nor indeed, except in the number of the rays which support the fins, is there any considerable difference between the two species." In *nama*, D. $7/\frac{1}{17}$, A. $\frac{3}{18}$: in *phula*, D. $7/\frac{1}{15}$, A. $\frac{3}{16}$, are the numbers he records.

As regards the *bogoda*, he observes it has 16 soft rays in the dorsal and 17 in the anal fin, and "a long transparent body devoid of scales," "but that it differs in nothing remarkable from the two former (*nama* and *phula*) except in the number of soft rays contained in the back and vent fins, and in that contained in the pectorals, each of which has twelve."

Amongst Buchanan's MSS. drawings in Calcutta, is one $1\frac{7}{10}$ inches long, termed *Centropomus phulchanda*, which his notes show to be the *phula*, and a second $2\frac{3}{10}$ inches long of the *bogoda*.

Having brought together upwards of thirty specimens from different localities of India and Burma, I find that this species is subject to variation, but some points remain the same in all. Although the comparative length of the longest dorsal spine varies, it retains its proportion to the third of the anal, which appears to be invariably the longest in that fin: the last dorsal and anal rays are divided to their bases, (counting each as 1) and the following numbers exist in my specimens, D. $7/\frac{1}{13-15-16-17}$, A. $\frac{3}{14-15\ 16\ 17}$, certainly the most common is D. $7/\frac{1}{15}$, A. $\frac{3}{16}$: but of course if we count the last dorsal and anal rays divided to their bases as two, which

Buchanan frequently did, it would cause my figures to stand thus D. $7\frac{1}{14-16-17-18}$, A. $\frac{3}{15-16-17-18}$. In Cuv. and Val. it is observed that the *A. oblonga* has D. $7/\frac{1}{15}$, A. $\frac{3}{14}$, and the black dots and the shoulder mark appear to have been absent, but these dots often disappear in specimens which have been long kept, that on the base of the anal is generally first lost, and subsequently the others. The variation in the number of rays has been already referred to. McClelland observes *A. Indica* has D. $\frac{3}{18}$ an evident misprint; he also mentions the depth of the body equal to its length.

Habitat.—Throughout the fresh waters of India, Assam, and Burma, attaining three or four inches in length.

2. Ambassis ranga, Plate XIV, fig. 6.

Chanda ranga, Ham. Buch. Fish. Ganges, pp. 113, 371, pl. 16, f. 38.

Chanda lala, Ham. Buch. l. c. pp. 114, 371, pl. 29, f. 39; Bleeker, Beng. en Hind. p. 88, and Verh. Bat. Gen. xxv, t. i, f. 1.

Ambassis ranga et *lala*, Cuv. and Val. ii, pp. 183, 184.

Ambassis Barlovi,* Sykes, Fishes of Dukhun. Trans. Zool. Soc. i, p. 350, pl. 60, f. 1.

Ambassis alta, Cuv. and Val. ii, p. 183; Günther, Catal. i, p. 227.

Ambassis lala, McClelland, Cal. Journ. Nat. Hist. v, p. 150, t. 4, fig. 1.

Ambassis lala, Blyth. Proc. Asi. Soc. Beng. 1860, p. 138.

Chandee, Beng. and N.W. Prov.: *Pee-dah*, Sind.: *Laal-chandee*, Ooriah.

B. vi, D. $7/\frac{1}{13-15}$, P. 11, V. 1/5, A. $\frac{3}{14-16}$, C. 17, L. r. 60-70, L. tr. 13/—.

In the adult, length of head 4/13 to 1/4, of caudal 1/4 to 2/9, height of body 2/5 to 3/7 of the total length. *Eyes*—diameter 2/5 of length of head, 1/2 a diameter from end of snout, and 3/4 of a diameter apart. Dorsal and abdominal profiles both very convex, but the profile over the eyes is slightly concave. The maxilla reaches to below the middle of the orbit. Vertical limb of preopercle sometimes entire, more commonly finely serrated, but in some specimens, especially on the Bombay side of India, and in Burma, rather coarsely so: the double margin of horizontal limb of the preopercle serrated: sub- and inter-opercles entire. Preorbital with about six denticulations on its inferior edge, and a strong one on its anterior superior angle directed towards the eye and about five more along the upper edge of that bone. Another spine at the middle of the posterior edge of the orbit, with five more, but decreasing in size along its upper half. *Teeth*—villiform in the jaws, vomer, and palate, none on the tongue. *Fins*—second spine of the dorsal equals the distance from the middle of the orbit to the posterior end of the head, and is generally as long although sometimes shorter than the third: the ventral almost reaches to the commencement of the anal: second anal spine of equal strength but slightly shorter than the third which equals two-fifths of the height of the body above it: caudal deeply forked. In Burma the second anal spine is comparatively shorter than in Indian specimens. *Colours*—olive, having a dark mark composed of spots on the shoulder, being the remains of a band present in the young. The margins of the vertical fins are usually somewhat dark.

In the *young*, termed by Buchanan *lala*, the fish is of a bright yellow or orange colour, with four or five dark vertical bands which are formed of fine black dots. The first dorsal is nearly black, the second and the anal as well as occasionally the ventral have deep black edges. Buchanan mentions yellow spots as sometimes present.

This species appears to be subject to greater variations in accordance with age than is seen in any other species of *Ambassis*. In examining the highest dorsal spine in comparison with the length of the fish, in 8 specimens, I found it to be as follows:

			inches.		inch.				inches.			
No. 1,	total	length	$1\frac{2}{10}$:	of body	1 :	height	of dorsal	spine	3/10	or	$3\frac{1}{3}$	in the length of the body excluding the caudal fin.
No. 2	,,	,,	$1\frac{4}{10}$:	,,	$1\frac{1}{10}$:	,,	,,	,,	3/10	,,	$3\frac{2}{3}$	,, ,, ,,
No. 3	,,	,,	$1\frac{6}{10}$:	,,	$1\frac{2}{10}$:	,,	,,	,,	3/10	,,	1/4	,, ,, ,,
No. 4	,,	,,	$1\frac{7}{10}$:	,,	$1\frac{2}{10}$:	,,	,,	,,	3/10	,,	1/4	,, ,, ,,
No. 5	,,	,,	$2\frac{3}{10}$:	,,	$1\frac{7}{10}$:	,,	,,	,,	4/10	,,	$4\frac{1}{4}$	,, ,, ,,
No. 6	,,	,,	$2\frac{4}{10}$:	,,	2 :	,,	,,	,,	4/10	,,	1/5	,, ,, ,,
No. 7	,,	,,	$2\frac{6}{10}$:	,,	2 :	,,	,,	,,	4/10	,,	1/5	,, ,, ,,
No. 8	,,	,,	3 :	,,	$2\frac{3}{10}$:	,,	,,	,,	9/20	,,	1/5	,, ,, ,,

Irrespective of the above, demonstrating how the average proportional length of the dorsal spines to that of the body decreases with age, it is remarkable that in all under $1\frac{1}{2}$ inches in length the second anal spine is the longest: as their size increases the second and third become of equal length: but in the adult the third is almost invariably the longer.

Habitat.—Throughout India and Burma, to a few inches in length.

3. Ambassis baculis, Plate XV, fig. 1.

Chanda baculis, Ham. Buch. Fish. Ganges, pp. 112, 371.

Ambassis baculis, Cuv. and Val. ii, p. 187.

* I find on Sykes' original drawing, *Gandreechee*, given as the native name of this species, and *Chanda ranga*, Buch. for which *Ambassis Barlowii* was subsequently substituted.

Ambassis notatus, Blyth, Proc. Asi. Soc. of Beng. 1860, p. 138.
Kung-gi, Punj.: *Nga-koun-ma*, or *Nga-zin-zat*, Burm.

B. vi, D. $7\frac{1}{13}$, P. 12, V. 1/5, A. $\frac{3}{13}$, C. 17, L. r. 80.

Length of head 1/4, of caudal 1/4, height of body 1/3 of the total length. *Eyes*—diameter 1/3 of length of head, 1/2 to 2/3 of a diameter from end of snout, and also apart. Body compressed: lower jaw rather shorter than the upper. The maxilla reaches to below the first third of the orbit. Preorbital strongly serrated along its lower edge and having a sharp spine directed towards the orbit at its anterior-superior angle followed by several more along its upper edge. The whole of the upper edge of the orbit serrated. Vertical limb of preopercle entire, the whole of the lower edge of the horizontal limb strongly serrated, and a few serrations near the angle of its upper edge: sub- and inter-opercles entire. *Teeth*—villiform in jaws, vomer, and palate. *Fins*—second spine of the first dorsal fin the highest and equal to the length of the head behind the hind edge of the orbit, and rather more than half the height of the body below it; the seventh spine rather longer than the sixth. Ventral reaches three-quarters of the distance to the anal. Third anal spine slightly the longest: caudal forked, lower lobe slightly the longer. *Lateral-line*—complete, it becomes straight opposite the first-third of the second dorsal fin. *Colours*—yellowish-olive: a golden spot on the occiput: black along the top of the first dorsal fin: second dorsal and anal darkest externally: front of each anal ray blackish: caudal dark along its base and also with blackish tips to each lobe.

Buchanan observes that it has "the body short and transparent, and devoid of scales and with a yellow mark on the nape." It is said to resemble the *bogoda* in colour, and the *ranga* in shape. A figure of it exists amongst his MSS. drawings $1\frac{2}{10}$ inches in length and marked *Centropomus? bahrul.*

The *Ambassis baculis* principally differs from the *A. nama* in its form being higher, its lower jaw the shorter and not crooked to one side, its vertical limb of the preopercle being strongly serrated, and its possessing no canine or enlarged teeth in its jaws.

Habitat.—Fresh waters of Orissa, Bengal, and as far north as the Punjab: also in Burma. The figure is taken from a specimen $1\frac{7}{10}$ inches in length, captured at Lahore.

4. **Ambassis Thomassi**, Plate XV, fig. 2.

Day, Proc. Zool. Soc. 1870, p. 369.
Mullu-cherú, Mal.: *Mullu-tharu*, Tel.: *Mullu-jubbu*, Canarese.

B. vi, D. $7/\frac{1}{10-12}$, P. 15, V. 1/5, A. $\frac{3}{9-10}$, C. 15, L. l. 35-41, L. tr. 7/17.

Length of head $3\frac{1}{3}$ to 2/7, of caudal 4/17 to 1/4, height of body 1/4 to 1/3 of the total length. *Eyes*—diameter from 1/3 to $3\frac{1}{4}$ of length of head, 3/4 of a diameter from end of snout, and 1/2 a diameter apart. The younger specimens are rather more oval than the adults: lower jaw the longer: a slight concavity over the orbits, owing to a rise from the nape to the base of the dorsal fin. The maxilla reaches to below the middle of the orbit. Vertical limb of preopercle finely serrated, its lower double edge more coarsely so especially at the angle: posterior half of lower edge of interopercle strongly serrated. Lower edge of preorbital with about nine denticulations, sometimes becoming more numerous (up to 15) and smaller with age, and a raised usually serrated edge along its upper third, which sometimes becomes blunted with age. One spine at the posterior-superior angle of the orbit (becoming bifurcated with age,) and the lower two-thirds of its margin serrated (these becoming blunted with age). *Teeth*—in villiform bands in jaws, vomer, and palate, an outer rather enlarged row in both jaws, none on tongue. *Fins*—second dorsal spine strong and nearly as long as the head without the snout: the ventral reaches as far as the anal spines: second anal spine equals that of the third and half the length of the head: caudal deeply forked. *Lateral-line*—continuous. *Pseudobranchiæ*—well developed. *Colours*—greyish, spotted with silvery, there are also brownish basal spots on many of the scales, more especially along the back.

Habitat.—The coasts of Canara as low as Cochin: it is found some distance inland even in elevated localities: it attains to at least $6\frac{1}{2}$ inches in length.

5. **Ambassis Commersonii**, Plate XV, fig. 3.

? *Sciæna safgha*, Forsk. Desc. Anim. p. 53.
? *Perca safgha*, Bl. Schn. p. 86.
Centropomus ambassis, Lacép. iv, p. 273.
Ambassis Commersonii, Cuv. and Val. ii, p. 176, pl. 25; Rüpp. N. W. Fische. p. 89; Bleeker, Perc. p. 30, and Ambassis, p. 95: Günther, Catal. i, p. 223; Day, Fishes of Malabar, p. 15.
Ambassis macracanthus, Bleeker, Perc. p. 30; Günther, Catal. i, p. 227; Day, Fishes of Andamans, P. Z. S. 1870, p. 681 (not synonym.)

B. vi, D. $7/_{9}\frac{1}{11}$, P. 13, V. 1/5, A. $_{9}\frac{3}{10}$, C. 15, L. l. 30-33, L. tr. 4/9, Vert. 9/15.

Length of head about 1/4, of caudal 2/9, height of body $3\frac{1}{4}$ to 2/7 of the total length. *Eyes*—diameter 1/3 to 2/7 of length of head, 1/2 a diameter from end of snout, and also apart. Dorsal and anal profiles about equally convex: lower jaw the longer, its cleft very oblique, so that when closed it forms a portion of the anterior profile. The maxilla reaches to below the first third of the orbit. Preorbital rather strongly serrated, the serratures being directed downwards and slightly backwards. Vertical limb of preopercle entire, its inferior

having its double edge serrated, two or three coarser teeth being at the angle: lower margin of interopercle entire. Two or three small and very blunt denticulations at the posterior superior angle of the orbit and in a line between it and the posterior-superior angle of the opercle. *Teeth*—villiform in the jaws, in a single Λ-shaped row in the vomer, and also present on the palatines: tongue usually with a narrow band along its centre. *Fins*—dorsal spines strong, transversely lineated, giving a serrated appearance to the second, which is the longest, and equal to the length of the head behind the front margin of the orbit, or even slightly longer: the ventral does not extend to the anal: second anal spine the strongest and nearly as long as the third, which almost equals the third of the dorsal: caudal deeply forked, upper lobe usually the longer. *Lateral-line*—continuous. *Pseudobranchiæ*—well developed. *Colours*—silvery, with purplish reflections: a bright silvery line from the eye to the caudal fin: interspinous membrane between the second and third dorsal spines dark.

In examining six specimens of this fish, the following were the proportions of the highest dorsal spine as compared with the length of the body.

No 1,	total length	$3\frac{5}{10}$	inches :	without caudal fin	$2\frac{6}{10}$	inches :	dorsal spine	$\frac{7}{10}$	inches	or	$3\frac{5}{7}$	of length of body.
,, 2,	,,	$3\frac{6}{10}$	,, :	,,	$2\frac{7}{10}$	: ,,	,,	$\frac{7}{10}$	,,	,,	$3\frac{6}{7}$	,, ,,
,, 3,	,,	$3\frac{9}{10}$	,, :	,,	$2\frac{9}{10}$	: ,,	,,	$\frac{8}{10}$	,,	,,	$3\frac{5}{8}$	,, ,,
,, 4,	,,	4	,, :	,,	$3\frac{1}{10}$	: ,,	,,	$\frac{8}{10}$	,,	,,	$3\frac{7}{8}$	,, ,,
,, 5,	,,	$4\frac{6}{10}$	,, :	,,	$3\frac{5}{10}$	: ,,	,,	$\frac{9}{10}$	,,	,,	$3\frac{8}{9}$	,, ,,
,, 6,	,,	5	,, :	,,	$3\frac{8}{10}$	: ,,	,,	$\frac{9}{10}$	,,	,,	$4\frac{2}{9}$	,, ,,

The specimens in the British Museum, marked *A. Batjanensis*, Bleeker, have the preorbital serrated and not entire as stated in the Catalogue (Vol. i, p. 225), and otherwise closely resemble this species.

Habitat.—This common species extends from the Red Sea through those of India to North Australia: it ascends rivers and estuaries, attaining to six inches in length.

6. Ambassis nalua, Plate XV, fig. 4.

Chanda nalua, Ham. Buch. Fish. Ganges, pp. 107, 371, pl. 6, f. 36; Cantor, Catal. p. 6.?

Ambassis nalua, Cuv. and Val. ii, p. 182; Bleeker, Perc. p. 29, and Ambassis, p. 94; Günther, Catal. i, p. 225.

Ambassis Commersonii, Kner, Novara Fische, p. 41.

Kyoung-ma-sah, Burm.

B. vi, D. $7/\frac{1}{10-11}$, P. 15, V. 1/5, A. $\frac{3}{9-10}$, C. 15, L. l. 26-28, L. tr. 3/12.

Length of head 1/4, of caudal 1/4, height of body 2/5 of the total length. *Eyes*—diameter 2/5 of length of head, nearly 1/2 a diameter from end of snout, and 1 apart. A great rise in the dorsal profile from the snout to the commencement of the dorsal fin, but with a concavity over the eyes: lower jaw the longer: cleft of mouth very oblique. The maxilla reaches to below the middle of the orbit. Preorbital rather strongly serrated on both its inferior and superior borders: two short spines directed backwards at the posterior superior angle of the orbit. Vertical limb of preopercle entire, except a few serrations just above the angle, its double edge on its horizontal border strongly serrated, also the posterior half of the lower border of the interopercle. *Teeth*—villiform in jaws, vomer, and palate, a narrow band of teeth along the middle of the tongue. *Fins*—dorsal spines strong, the second the longest and equal to the length of the head behind the front edge of the orbit: the ventral does not quite reach to the anal: the pectoral extends to above the anal spines, the second and third of the latter of the same length, and almost equal to the third of the dorsal fin: caudal deeply forked. *Lateral-line*—continuous. *Pseudobranchiæ*—present. *Colours*—silvery, with a burnished lateral band: interspinous membrane dark between the second and third dorsal spines: a dark longitudinal band along either caudal lobe.

Cantor remarks, as observed by M. M. Cuvier and Valenciennes, that this species differs from *Lutjanus gymnocephalus*, Lacép. (syn. *Sciæna safgha*, Forsk.? *Centropomus ambassis*, Lacép. *Ambassis Commersonii*, Cuv. and Val.) by its comparatively shorter head, blunter muzzle and greater depth of the body (p. 6). Also in this species the interopercle is serrated, whilst it is entire in the *Ambassis Commersonii*.*

Habitat.—Calcutta in fresh and brackish water: Malabar coast and Andamans to the Malay Archipelago.

7. Ambassis interrupta, Plate XV, fig. 5.

Bleeker, Ceram, ii, p. 696, Atl. Ich. Perc. t. lxx, f. 5, and Ambassis, p. 97: Günther, Catal. i, p. 226.

Ambassis macracanthus, Day, Proc. Zool. Soc. 1870, p. 681.

B. vi, D. $7/\frac{1}{9-10}$, P. 13, V. 1/5, A. $\frac{3}{9-11}$, C. 18, L. l. 28, L. tr. 6/8.

Length of head 2/7, of caudal 2/7, height of body 2/5 of the total length. *Eyes*—diameter 2/5 of length of head, 1/2 a diameter from end of snout, and 3/4 of a diameter apart. Lower jaw the longer: cleft of mouth oblique. The maxilla reaches to below the front edge of the orbit. Preorbital with both its upper and lower edges serrated. Anterior edge of orbit serrated and two spines at its posterior-superior angle. Vertical limb of preopercle entire, the double edge of its horizontal limb serrated: interopercle with four denticulations at its angle. *Teeth*—villiform in jaws, vomer and palate. *Fins*—second dorsal spine nearly half the length of the body in the adult; the ventral does not extend to the anal fin: third anal spine slightly the longest:

* In some rare cases the posterior inferior angle of the interopercle has 2 or 3 very badly marked serrations in *A. Commersonii*.

caudal forked. *Scales*—a row along the bases of the dorsal and anal fins: two rows on the suborbitals. *Lateral-line*—interrupted. *Colours*—silvery with a narrow lateral band: second spine of the dorsal bright orange, the membrane between it and the third black: a dark longitudinal band along either caudal lobe.

As in other species of this genus, the comparative length of the highest dorsal spine varies with age, and in examining the 5 specimens in the British Museum, I find the following proportions exist.

Total length	$2\frac{7}{10}$ inches :	of body	2 inches :	highest dorsal spine	7/10 of an inch	or nearly	1/3	of length	of body.
"	$2\frac{5}{10}$ " :	"	2 " :	" "	8/10	" " "	$2\frac{1}{2}$	"	"
"	3 " :	"	$2\frac{2}{10}$ " :	" "	8/10	" " "	$2\frac{3}{4}$	"	"
"	$3\frac{2}{10}$ " :	"	$2\frac{4}{10}$ " :	" "	9/10	" " "	$2\frac{2}{3}$	"	"
"	$3\frac{2}{10}$ " :	"	$2\frac{3}{10}$ " :	" "	8/10	" " "	$2\frac{3}{4}$	"	"

But the comparative length of the same spine in my specimen from the Andamans is still greater:

Total length $1\frac{8}{10}$ inches: of body $1\frac{3}{10}$ inches: highest dorsal spine $\frac{6}{10}$ or nearly 1/2 of body.

Habitat.—Sea at the Andamans and Batavia: the specimen which is figured was taken at the Andamans, and is nearly 2 inches in length.

8. Ambassis Dayi, Plate XV, fig. 7.

? *Ambassis Malabaricus*, (C. & V.) Jerdon, Madr. Journ. Lit. & Science, 1849, No. xv, p. 140.

Ambassis nalua, Day, Fish. Malabar, p. 15, (not H. Buch.)

Ambassis Dayi, Bleeker, Nat. Verh. d. Holland. Maats. d. Weten. 3de Verz. Deel II, No. 2, 1874, p. 95.

B. vi, D. $\frac{1}{10-11}$, P. 16, V. 1/5, A. $\frac{3}{10}$, C. 16, L. l. 30, L. tr. 4/—.

Length of head 2/7, of caudal about 4/17, height of body 1/3 of the total length. *Eyes*—diameter 1/4 to 2/9 of length of head, 3/4 to 1 diameter from end of snout, and also apart. Snout pointed, lower jaw the longer, cleft not very oblique. The maxilla reaches to below the middle of the orbit. Preorbital serrated along its lower border, and one spine at its anterior-superior angle. Vertical limb of preopercle with some very minute serrations in the largest specimen, its lower limb serrated along both edges: interopercle serrated in its posterior half: subopercle entire. One spine at the posterior-superior angle of the orbit. *Teeth*—villiform, with a rather stronger outer row in the upper jaw. *Fins*—the following is the comparative height of the second dorsal spine to that of the body in two specimens:—

No. 1, total length, $1\frac{5}{10}$ inches: without caudal fin $1\frac{1}{10}$ inches: dorsal spine $\frac{3}{10}$ inches or $3\frac{2}{3}$ in length of body.
" 2, " " 7 " " " " $5\frac{4}{10}$ " " " $1\frac{2}{10}$ " " $4\frac{1}{2}$ " " "

The ventral reaches two-thirds of the distance to the base of the anal: the second and third anal spines of about equal length even in the young, but the second is the stronger: caudal deeply forked. *Lateral-line*—continuous. *Colours*—silvery glossed with purple, a broad lateral burnished band: interspinous membrane between the second and third dorsal spines dark: second dorsal, anal, and caudal stained dark at their edges.

The serrated interopercle and pointed snout at once show its distinction from *A. Commersonii* and *A. nalua*.

This may be Jerdon's *A. Malabaricus* (C. V.) of which he observes—"Height not a third of its length. Fin rays D. 7/$\frac{1}{11}$, A. $\frac{3}{9}$ &c. 5 inches long;" but as this short definition is equally applicable to three or four other species found in Malabar, and the type appears to have been lost, it becomes impossible to be certain. Bleeker *l.c.* observed on this species differing from *A. nalua*.

Habitat.—Malabar coast of India, attaining at least 7 inches in length.

9. Ambassis gymnocephalus, Plate XV, fig. 6.

Lutjanus gymnocephalus, Lacép. iii, t. 23, f. 3, and iv, p. 216.

Priopis argyrozona, (K. & v. H.) Cuv. & Val. vi, p. 503.

Ambassis Dussumieri, Cuv. and Val. ii, p. 181, vi, p. 503, and ix, p. 431; Quoy and Gaim. Voy. Astrol. Poiss. p. 651, pl. i, f. 3; Bleeker, Perc. p. 30; Günther, Catal. i, p. 225; Day, Fish. Malabar, p. 16; Kner, Novara Fische, p. 41.

Chanda Dussumieri, Cantor, Catal. p. 6.

Ambassis Vachelli, Peters, Mon. ber. Preuss. Akad. Wiss. 1868, p. 255, (not Richards.)

Ambassis gymnocephalus, Bleeker, Ambassis, p. 99.

Chandee, Ooriah.

B. vi, D. 7/$\frac{1}{9-10}$, P. 15, V. 1/5, A. $\frac{3}{9-10}$, C. 17, L. l. 27-29, L. tr. 3/8.

Length of head 2/9 to 1/4, of caudal 2/7 to 1/4, height of body 2/7 of the total length. *Eyes*—diameter dependant on age, in the young 2/5, in the adult nearly 1/3 of the length of the head, 1/2 a diameter from the end of snout, and also apart. Lower jaw the longer. The maxilla reaches to below the front edge of the orbit. Preorbital with six or seven denticulations directed downwards and backwards on anterior-inferior edge, and a few serrations on its posterior: the double edge on the inferior limb of the preopercle finely serrated, its vertical limb entire. Sub- and inter-opercles entire. Two or three strong spines directed backwards at the posterior-superior angle of the orbit, and another rather larger posterior to them, occasionally a small spine on the shoulder just before the commencement of the lateral line. *Teeth*—a single row of fine ones in jaws, vomer, and palate: a band along the centre of the tongue. *Fins*—dorsal spines strong, the second being nearly or quite as high as the third, or in a few cases a little longer, the longest is generally two-thirds the height of the body below it, and the second is very minutely striated on its posterior edge, as is also the spine of the second dorsal, the other spines are striated all across: the ventral reaches about two-thirds of the distance to the anal: the third anal

spine is longer but not quite so strong as the second, its length equals that of the fourth of the dorsal fin : caudal deeply forked, its upper lobe slightly the longer. *Scales*—two rows on the suborbital ring of bones, the lower of which is much the deeper. *Lateral-line*—interrupted after about from the eighth to the twelfth scale, in some specimens it ceases entirely. *Pseudobranchiæ*—well developed. *Colours*—silvery with a bright longitudinal lateral band, some brown spots on the upper third of the body in its front half : blackish between its second and third dorsal spines, also a black edge to the caudal.

In examining a large number of these fish the first thing that strikes one's attention is the variation in the length of the second and third dorsal spines, sometimes one, sometimes the other being the longer. Not only do they vary between themselves, but likewise as regards their comparative length to that of the remainder of the body. The undermentioned specimens are taken at random from upwards of fifty in my collection.

		inches.		inch.		inch.		
No. 1.	total length	$1\frac{3}{10}$,	exclusive of tail	1 :	height of dorsal spine	3/10 :	or $3\frac{1}{3}$	in length of body, excluding the caudal fin.
„ 2.	„ „	2	„ „	$1\frac{5}{10}$:	„ „ „	4/10 :	„ $3\frac{3}{4}$	„ „ „ „
„ 3.	„ „	$2\frac{1}{10}$	„ „	$1\frac{6}{10}$:	„ „ „	4/10 :	„ 1/4	„ „ „ „
„ 4.	„ „	$2\frac{3}{10}$	„ „	$1\frac{8}{10}$:	„ „ „	4/10 :	„ $4\frac{1}{2}$	„ „ „ „
„ 5.	„ „	$2\frac{4}{10}$	„ „	$1\frac{8}{10}$:	„ „ „	4/10 :	„ $4\frac{1}{2}$	„ „ „ „
„ 6.	„ „	$2\frac{4}{10}$	„ „	$1\frac{8}{10}$:	„ „ „	4/10 :	„ $4\frac{1}{2}$	„ „ „ „
„ 7.	„ „	$2\frac{8}{10}$	„ „	$2\frac{1}{10}$:	„ „ „	5/10 :	„ $4\frac{1}{5}$	„ „ „ „
„ 8.	„ „	$2\frac{8}{10}$	„ „	$2\frac{2}{10}$:	„ „ „	5/10 :	„ $4\frac{2}{5}$	„ „ „ „
„ 9.	„ „	$2\frac{9}{10}$	„ „	$2\frac{3}{10}$:	„ „ „	5/10 :	„ $4\frac{3}{5}$	„ „ „ „
„ 10.	„ „	3	„ „	$2\frac{3}{10}$:	„ „ „	4/10 :	„ $5\frac{3}{4}$	„ „ „ „

The foregoing distinctly shows how the comparative length of the dorsal spines to that of the remainder of the body decreases with age, and renders it probable that *Ambassis Buruensis*, Bleeker (Boeroe, p. 396), is very closely allied to this species.

Habitat—East coast of Africa, seas of India to the Malay Archipelago and China : it attains at least 4 inches in length. Although generally captured in the sea or saline backwaters, I obtained a specimen from the fresh water in the Cochin State several miles inland.

10 Ambassis urotænia, Plate XV, fig. 8.

Bleeker, Amb. and Ceram, p. 257 ; Günther, Catal. i, p. 224.
? *Ambassis denticulata*, Klunz. Verh. z. b. Ges. in Wien, 1870, p. 719.

B. vi, D. $7/\frac{1}{9}$-$\frac{1}{10}$, P. 13, V. 1/5, A. $\frac{3}{9}$-$\frac{3}{10}$, C. 18, L. l. 27-28, L. tr. 3-4/10.

Length of head 1/4, of caudal 1/4, height of body 4/13 of the total length. *Eyes*—diameter 2/5 of length of head, 1/2 a diameter from end of snout, and 3/4 apart. Lower jaw the longer : cleft of mouth very oblique. The maxilla reaches to below the front edge of the orbit. Preorbital with seven sharp teeth along its inferior edge : a spine at the posterior-superior angle of the orbit. Vertical limb of preopercle entire except two serrations just above its angle : its horizontal double edge serrated, the lower the most coarsely so : sub- and inter-opercles entire. *Teeth*—villiform in jaws, vomer, and palate : a small central band at the root of the tongue. *Fins*—second spine of the dorsal longest and eqúal to one quarter or two-ninths of the total length, and rather above half the height of the body below it : ventral reaches two-thirds of the way to the anal fin : third anal spine usually slightly the longest but not equalling the longest of the dorsal. *Scales*—a single row along the suborbital ring of bones. *Lateral-line*—curves downwards under the middle of the soft dorsal, but in an interrupted or semi-interrupted manner. *Colours*—Silvery with a burnished lateral band : the interspinous membrane between the second and third dorsal spines black : a dark longitudinal band along either lobe of the caudal.

Dr. Günther observes, P.Z.S. 1871, p. 655, that *Ambassis miops*, Günther, differs from *A. urotænia*, Bleeker, by the smaller size of the eye, and by the lateral-line being continuous. The diameter of the eye in *A. urotænia* is equal to the length of the postorbital portion of the head. In *A. miops* the lateral-line forms a distinct and continuous curve from opposite the end of the dorsal fins, whilst there are two rows of scales along the suborbitals.

Habitat.—Seychelles, Andamans, and the Malay Archipelago. It closely resembles the *A. gymnocephalus*, but its lateral-line is entire : it has only one row of scales along the suborbitals and the comparative height of its body differs. It appears to be common at the Andamans.*

* **Bogota infuscata.**

Blyth, J.A.S. of Bengal, 1860, p. 139 ; Day, Proc. Zool. Soc. 1869, p. 515.
D. $10/\frac{1}{10}$, V. 1/5, A. 3/8, C. 17.

Preopercle strongly serrated with large teeth at its angle. A spine directed backwards, apparently on the subopercle. A long spine on the opercle. Preorbital entire. Lower jaw the longer. *Teeth*—in jaws villiform. *Fins*—second anal spine the longest. *Scales*—none now visible. *Colours*—brownish-black, except the fins, which are of a dirty yellowish white.

The specimen is half an inch long and in a very bad condition. The occiput is broken across : in fact it is now too damaged to admit of a complete description. One thing is evident, that it does not belong to the genus *Ambassis*, it may be the fry of a species of *Priacanthus*. For these reasons I refer to it in a note.

Blyth described it thus : "a minute species (if adult) $\frac{9}{16}$ in. long by $1\frac{1}{8}$ in. depth, *minus* the fins : with the tail much less forked

Genus, 11—Apogon, *Lacép.*

Amia, Gronovius: *Apogonichthys*, Bleeker: *Monoprion*, Poey: *Mionorus*, Krefft: *Archamia*, *Lepidamia*, and *Glossamia*, Gill.

Branchiostegals seven: pseudobranchiæ present, usually well developed. Opercle not spinate. Preopercle with a double edge, either or both of which may be serrated, crenulated, or entire. Teeth villiform in the jaws, vomer, and palatines, without canines: tongue smooth. Two separate dorsal fins, the first with six or seven spines: the anal with two. Lateral-line distinct and entire. Scales ctenoid, as a rule large and deciduous, but occasionally they are rather small. Cæcal appendages when present few.

Geographical distribution.—From the Red Sea and East coast of Africa, through the seas of India and Malay Archipelago to Australia, and even beyond. These small fishes are marine, and are numerous in sheltered spots as inside harbours, and some have been captured at the mouth or even a short distance up tidal rivers and backwaters. In the Indian region they are most numerous off the Sind and Bombay coasts, and Andaman islands.

Uses.—Although small, they are eaten fresh, dried, or salted, by the natives of India.

The fishes of this Genus, after having been primarily divided in accordance with the number of spines in the first dorsal fin, have undergone various subdivisions, the most popular of which seems to be as regards their colours. The longitudinally or transversely banded ones, those which possess or are deficient in the caudal blotch, have been separated on several plans, and although such may possess advantages they appear to be counterbalanced by marks sometimes disappearing or perhaps never having existed in the specimen. Consequently colour will still be omitted from indicating the position of any species, and the number of spines, rays, and scales employed for this purpose. It seems also questionable whether any considerable value can be placed upon the serrations about the bones of the head, especially of the orbits, as such appear to be more distinct in some specimens than in others, and may vary with age.

SYNOPSIS OF SPECIES.

1. *Apogon multitæniatus*, D. 7/$\frac{1}{9}$, A. $\frac{2}{8}$, L. l. 38. Outer edge only of preopercle serrated. Pinkish, with violet lines, along the body: fins scarlet, the vertical ones having black borders. Red Sea, coasts of India.

2. *Apogon kalosoma*, D. 7/$\frac{1}{9}$, A. $\frac{2}{8}$, L. l. 35-36. Outer edge only of preopercle serrated. Reddish, with a dark band from the snout to the end of the centre of the caudal fin: another above it: a black spot at the base of the tail: a dark mark on first dorsal fin, a band along the base of the second dorsal. Seas of India to the Malay Archipelago.

3. *Apogon nigricans*, D. 7/$\frac{1}{9}$, A. $\frac{2}{8-9}$, L. l. 25-26. Outer edge of preopercle and shoulder serrated. Greyish, with dark vertical bands and spots on the head. Madras.

4. *Apogon frenatus*, D. 7/$\frac{1}{9}$, A. $\frac{2}{8}$, L. l. 27-28. Both edges of preopercle serrated, also the lower edge of the orbit. Three or four longitudinal bands along the body: a black spot sometimes present at the base of the caudal fin: a basal band along both soft dorsal and anal. Seas of India to the Malay Archipelago and beyond.

5. *Apogon tæniatus*, D. 7/$\frac{1}{9}$, A. $\frac{2}{8}$, L. l. 27. Outer edge of preopercle and shoulder bone serrated. Reddish brown: two vertical dark bands and a dark mark at the base of caudal fin. Red Sea to Madras.

6. *Apogon endekatænia*, D. 7/$\frac{1}{9}$, A. $\frac{2}{8}$, L. l. 26. Outer edge of preopercle, lower edge of orbit and shoulder serrated. A dark median and four or five lateral bands, a dark spot at the base of the caudal fin. Seas of India to the Malay Archipelago.

7. *Apogon quadrifasciatus*, D. 7/$\frac{1}{9}$, A. $\frac{2}{8}$, L. l. 26. Outer edge of preopercle and lower edge of orbit serrated. No median band: two along either side of the body. Seas of India to the Malay Archipelago.

8. *Apogon fasciatus*, D. 7/$\frac{1}{9}$, A. $\frac{2}{8}$, L. l. 25. Outer edge of preopercle and shoulder serrated. Four longitudinal bands along the body, one along soft dorsal and anal fins. Seas of India to the Malay Archipelago and beyond.

9. *Apogon Sarayensis*, D. 7/$\frac{1}{9}$, A. $\frac{2}{8}$, L. l. 26. Outer edge of preopercle serrated. Olive, with 4 or 5 narrow vertical bands on the anterior half of the body: a dark band over the upper half of the free portion of the tail: a streak from the eye to the angle of the preopercle: numerous brown spots on the head. Coasts of Africa, India, and beyond.

10. *Apogon nigripinnis*, D. 7/$\frac{1}{9}$, A. $\frac{2}{8}$, L. l. 26. Outer edge of preopercle and shoulder bone serrated. Greyish, with vertical bands over the body and free portion of the tail. Neither spots nor streaks on the head. Vertical fins black, except the caudal which is yellow, with a dark edge. Seas of India.

11. *Apogon Wassinki*, D. 7/$\frac{1}{9}$, A. $\frac{2}{8}$, L. l. 25-26. Outer edge of preopercle serrated. Golden, with a black head, four white longitudinal bands: fins orange. Andamans to the Malay Archipelago.

12. *Apogon aureus*, D. 7/$\frac{1}{9}$, A. $\frac{2}{8}$, L. l. 25-26. Outer edge of preopercle serrated. Pinkish, with a broad black band over the free portion of the tail: vertical fins reddish, with a narrow black border. Red Sea, seas of India to the Malay Archipelago.

than in B. nama (B.H.) Bleeker; and of a dusky or infuscated hue, having silvery gill-covers and a greenish silvery stripe on each side: fins paler than the body, with a blackish tinge on the anterior half of the first dorsal.

D. 10—1-10 ?—A. 3-8 ?

One specimen only from the Mutla. Presented by Major W. S. Sherwill."

13. *Apogon bifasciatus*, D. 7/$\frac{1}{9}$, A. $\frac{2}{8}$, L. l. 25. Outer edge of preopercle serrated. Grey, with two dark vertical bands : a black spot at the root of the caudal : fins dark. Red Sea, through those of India to the Malay Archipelago, and beyond.

14. *Apogon glaga*, D. 7/$\frac{1}{9}$, A. $\frac{2}{8}$, L. l. 24. Lower limb of preopercle crenulated. Yellowish-green above, becoming redder on the abdomen : scales dotted at their edges, with a pearly spot in their centres forming three light stripes : a dark interorbital band : upper half of first dorsal and edges of second dorsal and caudal black. Seas of India to the Malay Archipelago.

15. *Apogon auritus*, D. 7/$\frac{1}{9}$, A. $\frac{2}{7}$, L. l. 23. Preopercle entire. Spotted and marbled with brown : a circular black spot on the opercle surrounded by a narrow white ring. Red Sea, through seas of India.

16. *Apogon Ellioti*, D. 7/$\frac{1}{9}$, A. $\frac{2}{8}$, L. l. 26. Outer edge of preopercle and lower edge of orbit serrated. Golden : upper half of first dorsal black, a similar coloured band along the centre of the second dorsal and anal : soft dorsal and anal with black edges. East coast of Africa, seas of India to Japan.

17. *Apogon maculosus*, D. 7/$\frac{1}{8}$, A. $\frac{2}{7}$. Brown, with four rows of darker spots along either side : fins brown, dotted with black. Seas of India.

18. *Apogon macropterus*, D. 6/$\frac{1}{9}$, A. $\frac{2}{14-17}$, L. l. 22-26. Outer edge of preopercle serrated. White, with pinkish reflections : a black spot at the root of the tail. Seas of India to the Malay Archipelago.

19. *Apogon Sangiensis*, D. 6/$\frac{1}{9}$, A. $\frac{2}{8}$, L. l. 25. Outer edge of preopercle serrated. Golden tinged with red : a wide band from the snout through the eye to a little below the shoulder : a spot on the side of the free portion of the tail. Upper half of first dorsal black. Andamans to the Malay Archipelago.

20. *Apogon hyalosoma*, D. 6/$\frac{1}{9}$, A. $\frac{2}{8}$, L. l. 24-25. Outer edge of preopercle serrated. Olive, with a spot on either side of the tail : fins grey, blackish between the second and third dorsal spines. Seas of India to the Malay Archipelago.

21. *Apogon orbicularis*, D. 6/$\frac{1}{8}$, A. $\frac{2}{9}$, L. l. 22. Outer edge of preopercle and shoulder bone serrated. Olive-brown, a dark zone round the body from in front of the dorsal fin to behind the ventrals : head with black spots : ventrals nearly black. Andamans, to the Malay Archipelago and beyond.

22. *Apogon Ceramensis*, D. 6/$\frac{1}{9}$, A. $\frac{2}{9}$, L. l. 21. Outer edge of preopercle serrated. Greenish-brown, with some dark spots on the head : a dark band from the eye to the root of the caudal fin, where it ends in a black spot. Black between the second and third dorsal spines. Nicobars to the Malay Archipelago.

1. **Apogon multitæniatus**, Plate XVI, fig. 1.

Apogon multitæniatus, (Ehren.) Cuv. and Val. ii, p. 159; Klunz. Fische d. Roth. Meeres, Verh. z. b. Ges. Wien, 1870, p. 45, (not Bleeker).

B. vii, D. 7/$\frac{1}{9}$, P. 15, V. 1/5, A. $\frac{2}{8}$, C. 17, L. l. 37-38, L. tr. $3\frac{1}{2}$/12.

Length of head 3/10, of caudal 2/11, height of body 2/7 of the total length. *Eyes*—diameter 2/7 of length of head, 3/4 of a diameter from end of snout, and 4/5 of a diameter apart. Jaws of about equal length, the maxilla reaches to rather behind the middle of the orbit. The outer edge of both the vertical and horizontal limbs of the preopercle finely and nearly evenly serrated : shoulder bone and edges of orbit entire : a small flat opercular spine. *Teeth*—villiform in jaws, vomer, and palate. *Fins*—dorsal spines stout, the third and fourth are the highest, and equal in length to the postorbital portion of the head, or $2\frac{1}{3}$ in the height of the body; second dorsal nearly two-thirds as high as the body, its upper edge nearly straight : pectoral rounded, reaching to above the anal spines : ventral not reaching the anal, the rayed portion of which latter fin equals in height that of the second dorsal : caudal slightly emarginate. *Lateral-line*—tubes very arborescent. *Pseudobranchiæ*—well developed. Free portion of tail about as high at its base as it is long. *Colours*—of a slaty tinge along the back, becoming reddish on the head, sides, and abdomen : violet lines along the body, narrower than the ground colour, between the rows of scales, but which are most apparent after death. Fins, dorsal scarlet, black along its base, between the last two spines, and in its upper three-fourths : second dorsal scarlet, with a light edge and black tip : caudal scarlet, also with a light edge and black tip : pectoral and ventral scarlet : anal as second dorsal. Eyes scarlet in their anterior halves, with some black markings.

Dr. Bleeker having been good enough to compare my figure of this species with *A. Noordzieki*, observes that it appears to be distinct. The latter has the head more pointed, the profile from the snout to the dorsal a little concave, the rostro-ventral one less concave, and the cleft of the mouth less oblique.

Habitat.—One specimen $5\frac{3}{8}$ inches in length was obtained in Madras, April 3rd, 1867 : and two more in Bombay, April, 1874, one of which latter is figured. This is the species of which Jerdon remarks (M. J. L. and S. 1851, p. 129) : "*Cheilodipterus*, a species apparently belonging to this genus was once brought me without a name—its colours were reddish, with longitudinal brown lines, fins bright pink, edged with blackish. D. 6, 1-9. A. 2-8." A figure exists amongst Sir W. Elliot's drawings.

2. **Apogon kalosoma**, Plate XVI, fig. 2.

Bleeker, Banka, p. 448; Günther, Catal. i, p. 240.
Lepidamia kalosoma, Gill, Catal. Fish. Nat. Hist. Soc. Phil. 1863, p. 81.
Amia kalosoma, Bleeker, Apogonini, p. 16.

B. vii, D. 7/$\frac{1}{9}$, P. 15, V. 1/5, A. $\frac{2}{8}$, C. 17, L. l. 35-36, L. tr. 3/13.

Length of head 2/7, of caudal 1/5, height of body 2/7 of the total length. *Eyes*—diameter $2\frac{1}{2}$ to $2\frac{2}{3}$ in

the length of head, 1/2 a diameter from end of snout, and also apart. Jaws of about equal length, or the lower slightly the longer: the maxilla reaches to below the middle of the orbit. Preopercle having both its vertical and horizontal limbs finely and evenly serrated along their outer edges: no serrations on the shoulder bones. *Teeth*—villiform in the jaws, vomer, and palate. *Fins*—dorsal spines of moderate strength, the two first short, the third and fourth of nearly the same height and equal to half the length of the head, first spine of second dorsal two-thirds as high as the rays, and equalling the longest in the first dorsal fin: the pectoral reaches to over the anal spines: the caudal slightly emarginate. *Lateral-line*—tubes well developed, with small lateral branches. *Colours*—reddish, more especially over the head: a dark band proceeds from above the eye and passes to the upper edge of the free portion of the tail: a second from the snout goes through the eye to the base of the caudal fin where there exists a large black spot, it is subsequently continued along the middle of the caudal fin: a third band passes from the lower edge of the eye to the end of the base of the anal fin. Fins reddish, the front half of the first dorsal and the upper portion of its last half black, the remainder scarlet. A black band along the base of the second dorsal and anal: second dorsal, anal, and caudal, scarlet with black tips.

Habitat.—Madras to the Malay Archipelago. The specimen figured was captured at Madras, April 3rd, 1867.

3. Apogon nigricans, Plate XVI, fig. 3.

B. vii, D. $7/\frac{1}{9}$, P. 13, V. 1/5, A. $\frac{2}{8-9}$, C. 17, L. l. 25-26, L. tr. 2/7.

Length of head $3\frac{1}{3}$, of caudal 1/4 to 2/9, height of body $3\frac{1}{3}$ in the total length. *Eyes*—diameter 1/3 of length of head, 1 diameter from end of snout, and 3/4 of a diameter apart. Dorsal profile more convex than that of the abdomen. Lower jaw slightly the longer: the maxilla reaches to below the middle of the orbit. Both the vertical and horizontal limbs of the preopercle finely serrated on their outer edges, shoulder also serrated, orbit entire. *Teeth*—villiform in jaws, vomer, and palate. *Fins*—dorsal spines rather weak, the first two short, the third nearly as long as the fourth, which is rather more than half as long as the head. The spine of the second dorsal much higher than the third of the first dorsal and the rays much more elevated than the spine, being equal to 4/5 of the height of the body: pectoral and ventral both reach as far as the anal, the spine of which is half as high as the body, and the rays as long as those of the dorsal: caudal notched. Free portion of tail longer than it is high at its base. *Lateral-line*—nearly straight, tubes laterally expanded at their bases. *Colours*—greyish shot with yellow, several badly marked vertical dark bands narrower than the ground colour exist on the body and over the free portion of the tail. Head covered with dark brown spots, some of which have a light centre: opercles with purplish reflections: no streaks on the jaws or head. The whole of the body finely spotted with brown. Vertical fins black: pectoral with a dark base.

Habitat.—Madras.

4. Apogon frenatus, Plate XVI, fig. 4.

Val. Nouv. Ann. Mus. Hist. Nat. 1832, p. 57, pl. iv, f. 4: Bleeker, Amboina, p. 25, Günther, Catal. i, p. 241, and Fische d. Sudsee, p. 19, pl. xix, f. A.

Apogon vittiger, Bennett, Proc. Zool. Soc. 1833, p. 32.

Apogon melanorhynchos, Bleeker, Amb. and Ceram. p. 255, and l. c. p. 26 (ex parte.)

Amia frenata, Bleeker, Atl. Ich. Perc. t. lxiv, fig. 2, and Apogonini, p. 42.

B. vii, D. $7/\frac{1}{9}$, P. 16, V. 1/5, A. $\frac{2}{8}$, C. 17, L. l. 27-28, L. tr. 2/7.

Length of head 3/10, of caudal 1/5, height of body 2/7 of the total length. *Eyes*—diameter 1/3 of length of head, 1/2 a diameter from end of snout, and 3/4 of a diameter apart. Jaws of about equal length. The maxilla reaches to below the last third of the orbit. The outer edge of the vertical and horizontal limbs of the preopercle serrated, its intramarginal crest likewise more or less serrated, also some serrations along the lower edge of the orbit: none on the shoulder: a small opercular spine. *Teeth*—villiform in jaws, vomer, and palate. *Fins*—first and second dorsal spines short, the third nearly as long as the fourth which is the highest in the fin, and equals the length of the postorbital portion of the head. Pectoral nearly as long as the head excluding the snout: the ventral reaches two-thirds of the distance to the anal: caudal notched, upper lobe slightly the longer. *Lateral-line*—with well developed tubes having a small enlargement on either side near the base of each tube, which becomes arborescent in the adult. Free portion of the tail longer than it is high at its commencement. *Colours*—reddish, a dark band passes from the eye to the middle of the caudal fin: a narrower one from the upper edge of the orbit to the upper part of the caudal on which it is lost near its base: a third from below the eye to the lower portion of the caudal. A black band along the bases of the second dorsal and anal: dorsal, caudal, ventral, and anal black tipped. A black spot may be present at the base of the caudal fin.

Some specimens of this last variety were shown to me at the British Museum, as *A. quadrifasciatus*, but they are not identical with Cuv. and Val. species; the type specimen of this latter fish ($3\frac{7}{10}$ inches long), from Pondicherry, has only the free border of the preopercle serrated, its intramarginal crest being smooth. Two other specimens are marked by Valenciennes as *A. quadrifasciatus* from Bourbon, and are similar to the Pondicherry one.

Pristiapogon frenatus, (C.V.) Klunz. Fische R. M. Verh. z. b. Ges. Wien. 1870, p. 715, is considered by Günther to be this species; by Bleeker to be *Amia* or *Apogon melanorhynchus*, Blkr. (ex parte), being

distinguished from *A. frenatus* by its higher body ($3\frac{3}{4}$ to 1/4 in the total length) a serrated shoulder bone, a smooth intramarginal edge to the preoperele, and a black spot at the base of the caudal fin, &c.

Habitat.—Mauritius, seas of India to the Malay Archipelago and beyond.

5. Apogon tæniatus, Plate VIII, fig. 4.

? *Apogon tæniatus*, (Ehrenb.) Cuv. and Val. ii, p. 159; Rüpp. Atl. p. 48, and N. W. Fische, p. 87; Günther, Catal. i, p. 234.

Apogon tæniatus, Klunz. Fische R. M. Verh. z. b. Ges. Wien, 1870, p. 44.

B. vii, D. $7/\frac{1}{9}$, P. 15, V. 1/5, A. $\frac{2}{8}$, C. 17, L. l. 27, L. tr. 2/8.

Length of head $3\frac{1}{4}$, of caudal 2/9, height of body $3\frac{1}{4}$ in the total length. *Eyes*—diameter 2/7 of length of head, nearly one diameter from end of snout, and 3/4 of a diameter apart. Jaws of equal length: the maxilla reaches to below the last third of the eye. The outer edge of both the vertical and horizontal limbs of the preoperele, and the shoulder bone serrated; orbit entire. A flat opercular spine. *Teeth*—villiform in jaws, vomer, and palate. *Fins*—first dorsal spines rather strong, the fourth being the longest and equal to $2\frac{1}{4}$ in the height of the body: soft dorsal much higher than the spinous, being equal to 3/5 of the height of the body, its upper edge as well as the outer one of the anal slightly rounded: last dorsal and anal rays divided to their bases. Pectoral as long as the head behind the middle of the eye: ventral slightly longer and reaching the anal: caudal forked. *Lateral-line*—tubes arborescent, most distinctly so anteriorly. Free portion of tail rather longer than it is high at its base. *Colours*—reddish-brown shot with gold, having a black band from the bases of the first three dorsal spines to the axil of the pectoral fin: a second from the middle of the second dorsal to the commencement of the anal fin: a small black spot near the end of the lateral-line: inner third of ventral nearly black: a narrow dark band across the soft dorsal fin.

This species is evidently closely allied to *A. nigricans*.

The British Museum has received a specimen of this fish determined as above by Dr. Klunzinger. In Cuv. and Val. it is stated to be brownish, with five longitudinal bands. Dr. Klunzinger considers it a variety of *bifasciatus*, but the difference between the first dorsal fins in the two has led me to rather leave them as distinct species.

Habitat.—Red Sea and Madras, from whence the specimen figured (life size) was obtained.

6. Apogon endekatænia, Plate XVI, fig. 7.

Apogon endekatænia, Bleeker, Banka, p. 449.

Apogon novemfasciatus, Temm. and Schleg. Fauna Japon. Poiss. p. 2, t. ii, f. 2.

Apogon Schlegeli, Bleeker, Japan, p. 55.

Apogon fasciatus, Günther, Catal. i, p. 241; Kner, Novara Fische, p. 43; Klunz. Fische R. M. Verh. z. b. Ges. Wien, 1870, p. 713.

Amia endekatænia, Bleeker, Atl. Ich. Perc. t. xxxii, f. 2, and Apogonini, p. 31.

B. vii, D. $7/\frac{1}{9}$, P. 13, V. 1/5, A. $\frac{2}{8}$, C. 17, L. l. 26, L. tr. 2/7.

Length of head 2/7, of caudal 1/5, height of body 2/7 of the total length. *Eyes*—diameter 2/5 of length of head, 1/2 a diameter from end of snout, and also apart. The jaws equal in front: the maxilla reaches to below the last third of the orbit. Outer edges only of the vertical and horizontal limbs of the preoperele serrated: edges of orbit smooth: shoulder bone serrated. *Teeth*—villiform in jaws, vomer, and palate. *Fins*—first and second dorsal spines short, the third equal to two-thirds the height of the body below it. Pectoral equals the length of the head behind the middle of the eye: the ventral scarcely reaches so far as the anal: caudal slightly notched. *Lateral-line*—tubes distinct, those in the first half of the body with lateral arborescent branches. *Colour*—of a reddish-brown tinge, with a dark band from the upper edge of the orbit to the end of the second dorsal and continued along the upper margin of the free portion of the tail and caudal fin: the second passes below it to the base of the upper half of the tail, and then curves downwards: the third from the head along the body below the lateral-line to the tail: the fourth along the upper part of the lower jaw through the eye to the base of the pectoral fin. Sometimes intermediate, narrower and short dark bands are present between those described. A black spot at the base of the tail. First dorsal fin black in its front half, a black band along the centre of the second dorsal, a similar one along the base of the anal and continued to its last ray: dorsal, caudal, and anal fins with darkish edges.

Habitat.—From the Red Sea through those of India to the Malay Archipelago and beyond.

7. Apogon quadrifasciatus.

Cuv. and Val. ii, p. 153; Bleeker, Perc. p. 28: Cantor, Catal. p. 3; Peters, Wieg. Arch. 1855, p. 234; Günther, Catal. i, p. 239; Kner, Novara Fische, p. 43,

Amia quadrifasciata, Bleeker, Atl. Ich. Perc. t. lvii, f. 1, and Apogonini, p. 39.

B. vii, D. $7/\frac{1}{9}$, P. 14, V. 1/5, A. $\frac{2}{8}$, C. 17, L. l. 26, L. tr. 2/6.

Length of head $3\frac{1}{3}$, of caudal 1/5, height of body $3\frac{2}{3}$ to $3\frac{1}{2}$ in the total length. *Eyes*—diameter $3\frac{1}{4}$ in the length of the head, 3/4 of a diameter from end of snout, and also apart. Lower jaw slightly the longer: the width of the head equals half its length. The maxilla reaches to below the last third of the orbit. Some serrations along the lower edge of the orbit: the shoulder entire. The outer edge of the vertical and

horizontal limbs of the preopercle rather strongly serrated, its intramarginal crest entire. *Teeth*—villiform in jaws, vomer, and palate. *Fins*—dorsal spines of moderate strength, the first very short, the second scarcely above one-third of the length of the third, which is about the same height as the fourth and fifth, being equal to half the height of the body and two-thirds of the rays: soft portion of the fin with its upper edge cut square or slightly emarginate. Pectoral as long as the head behind the middle of the eye: the ventral reaches the anal. Second anal spine 2/5 of the height of the body: caudal emarginate. *Lateral-line*—tubes well developed with a basal enlargement which in some appears to be slightly arborescent. *Colours*—a broad brown band passes from the snout through the eye and is continued to the end of the caudal fin: another from the upper edge of the eye to above the free portion of the tail and continued to the base of the caudal fin. No median band from the eye to the base of the dorsal fin. A badly developed basal band along the soft dorsal and another on the anal fin: no black spot at the base of the caudal.

Habitat.—Seas of India, to the Malay Archipelago and beyond.

8. Apogon fasciatus.

Mullus fasciatus, White, N. S. Wales, p. 268, fig. 1.

Apogon novemfasciatus, Cuv. and Val. ii, p. 154; Bleeker, Timor, i, p. 163; Peters, Wieg. Arch. 1855, p. 234; Kner, Novara Fische, p. 43.

Apogon Balinensis, Bleeker, Perc. p. 28, and Verh. Bat. Gen. xxii, Bali, p. 5.

Apogon Aroubiensis, Hombr. and Jacq. Voy. Pôle Sud. Poiss. p. 31, pl. i, fig. 1.

Apogon fasciatus, Quoy and Gaim. Voy. Freyc. p. 344; Günther, Fische d. Sudsee, p. 19, t. xx. fig. A and B.

Amia fasciata, Gill, Proc. Nat. Soc. Phil. 1863; Bleeker, Atl. Ich. t. xlviii, fig. 4, and Apogonini, p. 36.

B. vii, D. $7/\frac{1}{9}$, P. 13, V. 1/5, A. $\frac{2}{8}$, C. 17, L. l. 25, L. tr. 2/6.

Length of head $3\frac{1}{2}$, of caudal 1/5, height of body $3\frac{1}{2}$ to $3\frac{1}{3}$ in the total length. *Eyes*—diameter 1/3 of length of head, 3/4 of a diameter from end of snout, and the same apart. The width of the head equals two-thirds of its length: jaws of about equal length. The maxilla reaches to below the hind edge of the orbit. Outer edge of preopercle serrated along both limbs, its intramarginal crest entire. Edges of orbit smooth or sometimes a little roughened: shoulder serrated. *Teeth*—villiform in jaws, vomer, and palate. *Fins*—dorsal spines rather stout, the first short, the second about half as high as the third which is the longest and equal to two-thirds of the height of the body, and nearly as high as the rays: soft portion of the fin with its upper edge oblique. Pectoral as long as the head behind the middle of the eye: the ventral does not reach the anal: caudal emarginate. *Lateral-line*—tubes distinct, with arborescent lateral projections. *Colours*—reddish-brown with four lateral longitudinal bands, the third of which commencing at the snout passes through the eye to the centre of the base of the caudal fin, along which it is sometimes continued to its termination, this band is usually edged below by a narrow white one commencing at the pupil of the eye. The second and fourth bands may either end at the upper and lower edges of the base of the caudal fin, or be continued along it in a converging direction forming an arch near the end of the fin. A dark band runs along the first dorsal fin, and is continued as a black band along the middle or base of the second dorsal: the anal has also a basal band.

Habitat.—Seas of India to the Malay Archipelago and beyond.

9. Apogon Savayensis, Plate XVI, fig. 5.

Apogon savayensis. Günther, Proc. Zool. Soc. 1871, p. 656, and Fische Sudsee, p. 21, t. xix, fig. B.

B. vii, D. $7/\frac{1}{9}$, P. 12, V. 1/5, A. $\frac{2}{8}$, C. 17, L. l. 26, L. tr. 2/6.

Length of head $3\frac{1}{4}$, of caudal 1/5, height of body $3\frac{1}{4}$ to $3\frac{1}{2}$ in the total length. *Eyes*—diameter 2/5 of length of head, 1/3 of a diameter from end of snout, and 1/2 a diameter apart. The head is very slightly longer than high: lower jaw rather the longer. The rise from the snout to the dorsal fin is not considerable. The maxilla reaches to below the last fourth of the orbit. Vertical and horizontal limbs of preopercle serrated in their outer edges. Shoulder bone crenulated or entire: edges of orbit smooth. *Teeth*—in villiform bands in jaws, vomer, and palate. *Fins*—dorsal spines weak, the first very short, the second short, and the third not so high as the fourth, which equals the length of the post-orbital portion of the head and nearly half the height of the body below it. The pectoral reaches the anal, as does also the ventral: caudal slightly notched. *Lateral-line*—tubes well developed but rather short and having a slight lateral enlargement, it forms a moderate curve becoming straight below the end of the second dorsal. *Colours*—olive, with four or five narrow dark vertical bands from the first dorsal and first half of the second dorsal descending to the abdomen: a dark band, three scales wide, over the free portion of the tail and only reaching to half a scale below the lateral-line. A black streak from the lower edge of the eye to the angle of the preopercle; numerous small brown spots on the head and also on the body, more especially above the lateral-line. Fins grey, the anterior half of the first dorsal black: caudal with a dark edge externally margined with white.

Habitat.—Coast of Africa, seas of India and beyond, attaining to at least 3 inches in length.

10. Apogon nigripinnis, Plate XVI, fig. 6.

Cuv. and Val. ii, p. 152: Temm. and Schleg. Fauna Japon. Poissons, p. 3; Richardson, Ich. China, p. 221 (not Günther).

Amia nigripinnis, Bleeker, Apogonini, p. 64.

B. vii, D. 7/$\frac{1}{9}$, P. 15, V. 1/5, A. $\frac{2}{8}$, C. 17, L. l. 26, L. tr. 2½/6½.

Length of head 1/3 to 3¼, of caudal 2/11 to 1/5, height of body 1/3 to 3¼ in the total length. *Eyes*—diameter 1/3 to 3¼ in length of head, 1/2 to 2/3 of a diameter from end of snout, and 3/4 of a diameter apart. No very considerable rise from the snout to the base of the dorsal fin: snout rather elevated. Lower jaw slightly the longer: the maxilla reaches to below the last third or even hind edge of the orbit. Vertical and horizontal limbs of preopercle strongly and evenly serrated along their outer edges: shoulder-bone serrated. *Teeth*—villiform in jaws, vomer, and palate, an outer slightly enlarged row in each jaw. *Fins*—dorsal spines strong, the two first short, and the third not so high as the fourth which equals the length of the postorbital portion of the head and half the height of the body below it. The pectoral does not reach the anal, but the ventral does: second anal spine 1⅓ diameters of the eye in length: caudal rounded. *Lateral-line*—very slightly curved: tubes distinct, having a low lateral enlargement. *Colours*—greyish, with a dark vertical band from in front of the base of the first dorsal which passes backwards and downwards, increasing in width, and is lost below the whole length of the pectoral fin: a second goes from the base of the second dorsal to the lateral-line, and a third over the free portion of the tail. No black spots or streaks on the head, vertical fins black except the caudal, which is yellow and has a dark edge.

Cuv. and Val. type specimen is in excellent preservation in Paris, and identical with the above.

Habitat.—Madras, where it is common; it grows to at least 3$\frac{2}{10}$ inches in length. The figure is life-size.

11. Apogon Wassinki.

Bleeker, Timor, p. 258.

Apogon chrysotænia ?, Day, Proc. Zool. Soc. 1870, p. 682.

Amia Wassinki, Bleeker, Apogonini, p. 38.

B. vii, D. 7/$\frac{1}{9}$, P. 14, V. 1/5, A. $\frac{2}{8}$, C. 17, L. l. 25-26, L. tr. 2/7.

Length of head 3⅓ to 3½, of caudal 4½ to 4⅔, height of body 3½ in the total length. *Eyes*—diameter 2⅓ to 2½ in the length of head, 1/2 a diameter from the end of snout, and also apart. The width of the head at the opercles equals 1⅔ in the height of the body, the greatest height of the head equals its length excluding the snout. Lower jaw slightly the longer, the maxilla reaches to below the middle of the eye. Vertical and horizontal limbs of preopercle serrated in their outer edges, other bones of the head and shoulder entire. *Teeth*—villiform bands in jaws, vomer, and palate. *Fins*—first dorsal spine short, the second half the length of the third and fourth, which are the longest, and equal to 1½ in the height of the body, and 1/5 less than the longest ray, the spine of the second dorsal is a little shorter than the highest in the first dorsal fin: upper edge of first dorsal slightly emarginate. Pectoral 4/5 as long as the body is high. Ventral nearly reaching the anal. Second anal spine equal to half the height of the body, the rays similar to those of the soft dorsal. Caudal lobed. *Lateral-line*—makes a gradual curve, tubes well developed and having rather distinct lateral expansions, especially in the anterior portion of the body. *Colours*—brilliant golden with a black head. A silvery-white median band exists along the top of the head, it divides, one branch proceeding along the back on either side to the upper half of the tail: a second goes from above the orbit to the middle of the tail: a third through the orbit to the lower half of the tail: and a fourth from the angle of the mouth to below the base of the pectoral. Fins orange.

As my largest specimen is only 1⅗ inches in length it is not improbable that it is the young of some species which in the more adult stage has another name. It appears to agree with Bleeker's *A. Wassinki*, of which he procured one specimen 69‴ in length.

This fish is very common amongst the coral-reefs on the Andaman islands. As soon as the water is splashed they all crowd into the coral, concealing themselves amongst its sticks, apparently afraid that the splash has been occasioned by some large carnivorous fish.

Habitat.—Andamans and Nicobars.

12. Apogon aureus, Plate XVI, fig. 8.

Ostorhinchus Fleurieu, Lacép. iv, p. 24, iii, t. 32, f. 2.

Dipterodon hexacanthus, Lacép. iv, pp. 166, 168, iii. t. 30, f. 2.

Centropomus aureus, Lacép. iv, pp. 253, 273.

Apogon annularis, Rüppell, Atl. p. 48, and N. W. Fische, p. 85; Günther, Catal. i, p. 239; Klunz. Fisch. Roth. M. p. 713.

Apogon roseipinnis, Cuv. and Val. iii, p. 490, vi, p. 553; Bleeker, Amb. and Ceram. p. 253; Quoy and Gaim. Voy. Astrol. Poissons, p. 649, pl. i, f. 5; Peters, Wieg. Arch. 1855, p. 234.

Apogon aureus, Bleeker, Enum. pisc. p. 6.

Amia aurea, Bleeker, Atl. Ich. Perc. t. lix, f. 1, and Apogonini, p. 48.

Cul-sillandan, Tam.

B. vii, D. 7/$\frac{1}{9}$, P. 14, V. 1/5, A. $\frac{2}{8}$, C. 17, L. l. 25-26, L. tr. 2½/6, Cæc. pyl. 4.

Length of head 2/7, of caudal 2/9, height of body 1/3 to 2/7 of the total length. *Eyes*—diameter 2/5 to 2¾ in length of head, 1/2 a diameter from end of snout, and 3/4 apart. The lower jaw slightly the longer: the

maxilla reaches to below the middle of the orbit. Vertical limb of preopercle with its outer edge minutely serrated in its upper half, becoming more coarsely so at the angle and along the outer edge of its horizontal limb: edges of orbit and shoulder-bone entire. *Teeth*—villiform, in a single row on vomer and palate. *Fins*—dorsal spines rather slender, the first two short, the third not quite so long as the fourth, which equals half the length of the head and nearly half the height of the body below it; soft portion of the fin highest, and cut square or even slightly emarginate, especially in large specimens: pectoral reaches to above the anal: ventral reaches the anus: caudal emarginate. *Lateral-line*—tubes distinct, with numerous short lateral branches. *Pseudobranchiæ*—well developed. *Colours*—body pinkish shot with gold, a rather broad, black band at the root of the caudal fin over the free portion of the tail: some minute black spots around the jaws, on the upper portions of the opercles, and on the crown of the head. Fins reddish, first dorsal black tipped; ventral spine and outer ray black, and a narrow black edge to second dorsal, anal, and caudal. Variety *A. roseipinnis* has a violet band along the base of the anal fin.

In a female specimen 4 inches long, captured at Madras, January 9th, 1868, a black band passes through the eye to the opercle, which also has a vertical band of dots upon it: the ring round the free portion of the tail ends one row of scales below the lateral-line.

Habitat.—Red Sea, East coast of Africa, through the seas of India to the Malay Archipelago. Very common at Madras up to 5 or 6 inches in length, in June and July they are usually abundant. Specimen figured life-size.

13. Apogon bifasciatus, Plate XVI, fig. 9.

Rüppell, N. W. Fische, p. 86, t. 22, f. 2; Günther, Catal. i, p. 238;* Kner, Novara Fische, p. 42; Klunz. Fische d. Rothen Meeres, p. 711.

Apogon trimaculatus, Richardson, Ich. China, p. 221 (not C. V.)

? *Amia tæniata*, Bleeker, Nat. Verh. d. Holl. Maats. d. Weten. 3de Verz. Deel. ii, No. i, 1874, p. 24, and Apogonini, p. 24.

B. vii, D. $7/\frac{1}{9}$, P. 15, V. 1/5, A. $\frac{2}{8}$, C. 17, L. l. 25, L. tr. $2/7\frac{1}{2}$, Cæc. pyl. 3 (4 Kner.)

Length of head $3\frac{1}{4}$ to 2/7, of caudal 2/11, height of body 4/11 in the total length. *Eyes*—diameter 4/11 of length of head, 1/3 of a diameter from end of snout, and 2/3 apart. A considerable rise from the snout to the dorsal fin. The maxilla reaches to below the posterior third of the orbit. Vertical limb of preopercle finely serrated in its outer edge, rather more coarsely so at its angle, becoming very indistinct along the lower limb, the inner edge entire. Shoulder-bone serrated in the young, becoming nearly entire in the adult. *Teeth*—villiform in jaws, and in a band on the vomer and palatines. *Fins*—dorsal spines strong, the two first short, the third and fourth of about the same height and equal to two-thirds of the length of the head in the adult (proportionately higher in the young), or half the height of the body beneath: the spine of the second dorsal strong, and equal to half the length of the head. The pectoral reaches to above the anal spines: caudal emarginate in the adult, more rounded in the young. *Lateral-line*—forms a curve in the first part of its extent, which becomes straight opposite the end of the base of the anal fin: the tubes anteriorly are very arborescent laterally, but less so in the posterior half of the body. *Colours*—slaty-grey with bronze reflections: a dark vertical band from the first half of the dorsal fin passing down the side to below the pectoral fin, and a shorter but similar band from the first half of the second dorsal: a black spot at the root of the caudal. Fins, except the pectoral, blackish, or with black edges, due to fine black points, which are also spread over the jaws, head, and very finely over the body.

Habitat.—Red Sea, through the seas of India, to the Malay Archipelago and China. Very common at Madras up to 6 inches in length. It is very closely allied to *A. tæniatus*, which latter, however, has a much lower first dorsal fin.

14. Apogon glaga, Plate XVI, fig. 10.

Apogon glaga, Bleeker, Perc. p. 29.

Apogonichthys glaga, Bleeker, Japan, p. 57, and Atl. Ich. Perc. t. xxxiii, fig. 1; Günther, Catal. i, p. 247.

Amia glaga, Bleeker, Apogonini, p. 66.

B. vii, D. $7/\frac{1}{9}$, P. 16, V. 1/5, A. $\frac{2}{8}$, C. 17, L. l. 24-25, L. tr. 2/7.

Length of head 2/7, of caudal 1/5, height of body 2/7 of the total length. *Eyes*—diameter 2/7 of length of head, 1/2 a diameter from end of snout, and 1 apart. Lower jaw the longer: the maxilla reaches to below the last third of the orbit. Both limbs of preopercle entire, but the outer edge of the horizontal limb somewhat crenulated, its outline being sinuous: the other bones of the head entire, except the lower border of the orbit which is roughened. *Teeth*—villiform in the jaws, the outer row in the maxilla rather enlarged, and a few canine-like ones in the mandible: those in the vomer and palate in a single row of rather larger-sized ones than exist in the jaws. *Fins*—dorsal spines weak, the first short, the fourth the highest, equal to the length of the postorbital portion of the head, and nearly one-fourth higher than the spine of the second dorsal; soft dorsal fin considerably higher than the spinous. Pectoral reaches to above the anal spines. Caudal rounded. *Lateral-line*—tubes distinct, having a lateral basal enlargement. *Colours*—yellowish-green superiorly, becoming more roseate along the abdomen: a dark band between the hind fourth of the orbits. The approximating edges of

* Dr. Günther observes that *A. bifasciatus* has both the margins of the preopercle strongly serrated, the denticulations on the inner ridge being coarse, and gradually becoming more so at the angle: vomerine teeth in a single row.

the scales having minute black dots, forming horizontal lines, which are most distinct along the back: the scales in the second and third rows having a pearly white spot at the base of each. Upper half of the first dorsal black: second dorsal and caudal with black edges. A moderately wide band along the middle of the second dorsal, which appears to be sometimes spotted with blue.

Habitat.—Madras to $3\frac{2}{5}$ inches in length, as far as the Malay Archipelago.

15. Apogon auritus, Plate XVII, fig. 2.

Apogon auritus, Cuv. and Val. vii, p. 443; Günther, Fische d. Sudsee, p. 23.
Apogon punctulatus, Rüppell, N.W. Fische, p. 88, t. xxii, f. 4; Bleeker, Ceram. p. 696.
Apogonichthys polystigma, Bleeker, Amboina, p. 484, and Ternate, p. 372; Günther, Catal. i, p. 246.
Apogonichthys punctulatus, Bleeker, Arou, p. 36.
Apogonichthys auritus, Günther, Catal. i, p. 246; Day, Proc. Zool. Soc. 1870, p. 682.
Amia polystigma, Bleeker, Apogonini, p. 67.

B. vii, D. $7/\frac{1}{9}$, P. 12, V. 1/5, A. $\frac{2}{7-8}$, C. 17, L. l. 23-24, L. tr. 2/6.

Length of head 1/3, of caudal 2/9, height of body 2/7 to 1/4 of the total length. *Eyes*—diameter 1/3 to 2/7 of the length of head, 1/2 to 1/3 of a diameter from end of snout, and also apart. Jaws of about equal length: the maxilla reaches to slightly behind the posterior edge of the orbit. Edges of preopercle, also of the other bones of the head and shoulder entire. *Teeth*—villiform in the jaws, vomer, and palate. *Fins*—first dorsal spine very short, the third and fourth the highest, equal to the length of the postorbital portion of the head, and three-fourths as high as the rayed fin. Pectoral as long as the postorbital portion of the head. Ventral reaches two-thirds of the way to the anal, the second spine of which last fin is equal to two-fifths of the height of the body. Caudal rounded or cut rather square. *Lateral-line*—either ceases under the middle of the soft dorsal fin, or reappears lower down going direct to the centre of the base of the caudal fin: tubes distinct, generally with a basal swelling. *Colours*—body and head spotted and marbled all over with brown. A circular black spot on the opercle enclosed by a narrow white ring, which is present even in the fry.

Bleeker observes that he formerly considered this species as identical with *A. punctulatus*, Rüppell= *A. auritus*, C. V. the interrupted lateral line and the distribution of colours being much the same. He now divides them, as Rüppell's fish appears to have a higher body, 4 longitudinal yellow bands over the preopercle, and only 20 rows of scales.

Having examined specimens taken in the Red Sea and elsewhere, I have not found less than 23 scales along the lateral-line, and in two specimens from Zanzibar the lateral-line is continuous.

Specimen from	Suez, $1\frac{4}{5}$	inches	long:	height of	body	$3\frac{1}{2}$	in	the total	length.
,,	,, $1\frac{7}{10}$	,,	,, :	,,	,,	$3\frac{1}{4}$	,,	,,	,,
,,	Andamans, $1\frac{3}{5}$	,,	,, :	,,	,,	$2\frac{3}{4}$	,,	,,	,,
,,	Massuah, $1\frac{1}{10}$	,,	,, :	,,	,,	1/3	,,	,,	,,
,,	,, $1\frac{3}{5}$	,,	,, :	,,	,,	$3\frac{1}{2}$	,,	,,	,,
,,	Andamans, 2	,,	,, :	,,	,,	$2\frac{4}{5}$	,,	,,	,,
,,	Zanzibar, $2\frac{7}{10}$	,,	,, :	,,	,,	$3\frac{1}{3}$	,,	,,	,,
,,	Andamans, 3	,,	,, :	,,	,,	$3\frac{1}{3}$	,,	,,	,,
,,	Zanzibar, $3\frac{1}{2}$	,,	,, :	,,	,,	$3\frac{1}{2}$	,,	,,	,,

The foregoing measurements lead me to doubt the specific difference between *A. auritus* from the Red Sea, and my species from the Andamans which=*A. polystigma*, Bleeker.

Habitat.—Red Sea, East coast of Africa, seas of India to the Malay Archipelago and beyond.

16. Apogon Ellioti, Plate XVII, fig. 1.

Apogon nigripinnis, Jerdon, M. J. L. and Sc. 1851, p. 128, and Günther, Catal. i, p. 235, and Fische d. Sudsee, p. 21, (not Cuv. and Val.)

B. vii, D. $7/\frac{1}{9}$, P. 15, V. 1/5, A. $\frac{2}{8}$, C. 16, L. l. 26, L. tr. $2/6\frac{1}{2}$.

Length of head $3\frac{1}{4}$, of caudal 2/11, height of body 2/7 in the total length. *Eyes*—diameter 2/7 of length of head, 1/2 a diameter from end of snout, and 1 apart. Lower jaw very slightly the longer: the maxilla reaches to below the posterior edge of the orbit.* Vertical limb of preopercle entire, or very finely serrated on its lower half and outer edge, more distinctly round its angle and on the outer edge of its horizontal limb, there may also be a few serrations likewise along its inner angle: lower edge of orbit roughened: shoulder entire. *Teeth*—fine in jaws, vomer, and palate. *Fins*—spinous much lower than the soft dorsal, its third, fourth and fifth spines the highest, and equal to two-fifths of that of the body: the second dorsal three-fourths as high as the body, its upper edge and also that of the anal being rounded. Pectoral as long as the ventral, which does not reach the anal: caudal rounded. *Pseudobranchiæ*—present. Free portion of tail rather longer than high at its base. *Lateral-line*—at first arborescent, but posteriorly with a lateral plate-like prolongation on either side of the base of each tube. *Colours*—golden, upper surface of head and jaws, also upper portion of opercle with black spots:

* In examining some immature specimens of this fish in the British Museum, I found that at $1\frac{7}{10}$ inches in length, the diameter of the eye was 2/5 of the length of the head, and the maxilla reached to nearly below its centre. At 2 inches in length, the diameter of the eye was 1/3 of the length of the head, and the maxilla reached to below the last third of the orbit.

a greyish band along the side, terminating in the young in an indistinct lateral blotch by the side of the free portion of the tail. First dorsal white, with its upper half deep black: second dorsal yellow, having a black band along its centre, and a black outer edge: anal likewise with a black median band: caudal grey, with a white band margined with black, and an external white edge.

Habitat.—East coast of Africa, seas of India to China and Japan. Madras two specimens to 4 inches in length. Amongst Sir W. Elliot's drawings is one of this fish named *A. nigripinnis* by Jerdon.

17. Apogon maculosus.

Cuv. and Val. iv, p. 493; Günther, Catal. i, p. 236.

B. vii, D. $7/\frac{1}{8}$, V. 1/5, A. $\frac{2}{7}$.

Colours—brown, darkest anteriorly, having four rows of brown spots along either side, but none on the head. Fins brown, spotted with black.

Habitat.—This fish is said to have come from the seas of India, from whence M. de Ketlitz, a Russian naturalist, brought figures (? specimens), and from whom Cuv. and Val. obtained their information.

It is stated to attain three inches in length.

18. Apogon macropterus, Plate XVII, fig. 3.

(K. and v. H.) Cuv. and Val. ii, pp. 160; Bleeker, Perc. p. 168; Günther, Catal. i, p. 244.
? Apogon Zeylonicus, Cuv. and Val. iii, p. 492; Günther, Catal. i, p. 232.
Apogon argenteus, Val. Nouv. Ann. Mus. Hist. Nat. 1832, p. 60.
Apogon fucatus, Cantor, Catal. p. 4; Günther, Catal. i, p. 244.
Apogon macropteroides, Bleeker, Banka, p. 724; Günther, Catal. i, p. 245; Playfair, Fish. Zanz. p. 20.
Apogon Bleekeri, Günther, Catal. i, p. 245.
Archamia Bleekeri, Gill, Nat. Hist. Soc. Phil. 1863, p. 81.
Amia macropteroides, Bleeker, Amb. p. 280.
Apogon notata, Day, Proc. Zool. Soc. 1870, p. 936.
Amia macropterus, Bleeker, Ternate, p. 233, Atl. Ich. Perc. t. lxviii, f. 2. and Apogonini. p. 72.

B. vii, D. $6/\frac{1}{9}$, P. 13, V. 1/5, A. $\frac{2}{16\ (14\text{-}17)}$, C. 17, L. r. 22-26 (Cæc. pyl. 0, Cantor.).

Length of head 2/7, of caudal 1/6, height of body $3\frac{1}{2}$ to $3\frac{3}{4}$ in the total length. *Eyes*—diameter 2/5 to 1/3 of length of head, 1/2 of a diameter from end of snout, and also apart. Body rather elongated in shape and compressed. Lower jaw slightly the longer. The maxilla reaches to below the middle of the orbit. Angle of the preopercle rounded, the outer edge of vertical and horizontal limbs finely serrated, the other bones of the head entire. *Teeth*—villiform in jaws, vomer, and palate. *Fins*—dorsal spines weak, the third the highest and equal in length to the postorbital portion of the head, or behind the middle of the eye. The pectoral reaches to above the third or fourth anal ray: caudal forked. *Colours*—whitish, having a pink tinge, fins pinkish: a round black spot on the side close to the base of the caudal fin.

Habitat.—East coast of Africa, seas of India to the Malay Archipelago. It does not appear to attain more than 3 or 4 inches in length in India, and is very common at Madras.

19. Apogon Sangiensis, Plate XVII. fig. 4.

Bleeker, Sangi, p. 375; Günther, Catal. i. p. 235, and Fische d. Sudsee, p. 20.
Amia sangiensis, Bleeker, Atl. Ich. Perc. t. xli, f. 4, and Apogonini, p. 56.

B. vii, D. $6/\frac{1}{9}$, P. 13, V. 1/5, A. $\frac{2}{8\text{-}9}$, C. 17, L. l. 24-25, L. tr. $1\frac{1}{2}/7$.

Length of head 1/3 to $3\frac{1}{3}$, of caudal $4\frac{1}{4}$ to $4\frac{1}{5}$, height of body 1/3 to $3\frac{1}{4}$ in the total length. *Eyes*—diameter 1/3 of length of head, 2/3 of a diameter from end of snout, and also apart. Jaws of about equal length. The maxilla reaches to below the middle of the orbit. Outer edge of both vertical and horizontal limbs of preopercle very finely serrated, orbital edge rough, the other bones of the head and shoulder entire. *Teeth*—villiform. *Fins*—dorsal spines very weak, the third generally the longest and $1\frac{2}{3}$ in the height of the body. Ventral almost reaches the anal: caudal notched. *Lateral-line*—tubes distinct, having a lateral basal enlargement. *Colours*—golden tinged with red: a wide brown band passes from the snout, through the eye, ending on the posterior edge of the opercle, or else in a black spot a little below the shoulder: a round black spot on the side of the free portion of the tail close to the base of the caudal fin: a minute black spot on the back, close behind the base of the last dorsal ray. Upper half of first dorsal black. The anal fin is said to be sparingly spotted with blue in specimens from the Malay Archipelago.

Habitat.—Andamans to the Malay Archipelago.

20. Apogon hyalosoma, Plate XVII, fig. 5.

Apogon thermalis, Bleeker, Perc. p. 27, (not Cuv. and Val.)
Apogon hyalosoma, Bleeker, Singapore, p. 63, and Amboina, iv, p. 329; Günther, Catal. i, p. 321; Kner, Novara Fische, p. 42.
Amia hyalosoma, Bleeker, Atl. Ich. Perc. xxxi, f. I, and Apogonini, p. 57.

B. vii, D. $6/\frac{1}{9}$, P. 12-14, V. 1/5, A. $\frac{2}{8}$, C. 17, L. l. 24-25, L. tr. $2\frac{1}{2}/8\frac{1}{2}$.

Length of head 1/3 to $3\frac{1}{4}$, of caudal 1/5, height of body 1/3 of the total length. *Eyes*—diameter 2/7 to $3\frac{2}{3}$ in length of head, 3/4 of a diameter from end of snout, and 1 apart. Snout rather elevated. Lower jaw slightly the longer: the maxilla reaches to below the hind edge of the orbit. Both limbs of preopercle serrated along their outer edges, most slightly so on the vertical one: the other bones of the head and shoulder entire. *Teeth*—fine in jaws, vomer, and palate. *Fins*—dorsal spines of moderate strength, the second and third of about the same length, and equal to $2\frac{1}{3}$ in the height of the body, but not so high as the soft dorsal. Pectoral rather longer than the ventral, which latter reaches two-thirds of the distance to the base of the anal fin: soft anal as high as the soft dorsal: caudal lobed. *Lateral-line*—tubes distinct, some having a slightly arborescent base. *Colours*—olive, with a darkish blotch on the side at the base of the caudal fin: blackish between the second and third dorsal spine; fins grey.

Habitat.—Seas of India and Malay Archipelago, attaining at least six inches in length.

21. **Apogon orbicularis**, Plate XVII, fig. 7.

Apogon orbicularis, (Kuhl. and v. Hass.) Cuv. and Val. ii, p. 155, and vi, p. 495; Quoy and Gaim. Voy. Astrol. Poiss. p. 648, pl. i, fig. 4; Bleeker, Amb. & Ceram. p. 254, and Act. Soc. Ned. i, Amboina, p. 28; Günther, Catal. i, p. 233, and Fische d. Sudsee, p. 22, pl. xx, fig. D.

Amia orbicularis, Bleeker, Ceram. p. 188, and Nat. Verh. Holl. Maats. Weten. 3de Verz. Deel. II, No. i, 1874, p. 19.

B. vii, D. $6/\frac{1}{8-9}$, P. 12, V. 1/5, A. $\frac{2}{8-9}$, C. 17, L. l. 24-26, L. tr. $2\frac{1}{2}/7$.

Length of head 2/7, of caudal 1/4, height of body 2/5 of the total length. *Eyes*—diameter $2\frac{1}{2}$ to $2\frac{3}{4}$ in the length of head, 1/2 to 2/3 of a diameter from the end of snout, and 3/4 of a diameter apart. Lower jaw the longer: the maxilla reaches to below the middle of the orbit. The outer edges of both limbs of the preopercle serrated, as is also the shoulder-bone, the other bones of the head entire. *Teeth*—villiform in the jaws, vomer, and palate. *Fins*—second and third dorsal spines slightly higher than the fourth, two-thirds the height of the body and in length about equal to the rays in the second dorsal fin. Pectoral as long as the head excluding the snout. Ventrals reach the anal fin, the second spine of which last is two-fifths the height of the body, whilst the rays are similar to those of the soft dorsal. Caudal forked, its three outer rays on either side rather spinate and projecting. *Lateral-line*—tubes well-developed. Free portion of the tail slightly longer than high at its commencement. *Colours*—olive-brown, a dark zone round the body from in front of the first dorsal fin, and passing to behind the ventral. Head spotted with black. A cloudy band below the second dorsal fin: free portion of the tail with some black spots and blotches. First dorsal with some dark spots: ventral nearly black.

Habitat.—Andamans, Malay Archipelago and beyond. The specimen figured (life-size) is from the Andamans.

22. **Apogon Ceramensis**, Plate XVII, fig. 6.

Bleeker, Amb. and Ceram. p. 256; Günther, Catal. i, p. 235.

Amia Ceramensis, Bleeker, Atl. Ich. Perc. t. lviii, f. 1, and Apogonini, p. 45.

B. vii, D. $6/\frac{1}{9}$, P. 14, V. 1/5, A $\frac{2}{9}$, C. 17, L. l. 23-25, L. tr. 2/7.

Length of head $3\frac{1}{4}$, of caudal 1/5, height of body $3\frac{1}{4}$ in the total length. *Eyes*—$3\frac{1}{3}$ diameters in length of head, 3/4 of a diameter from end of snout, and 2/3 of a diameter apart. Dorsal profile rather concave over the eyes. Upper jaw slightly the longer: the maxilla reaches to below the last third of the orbit. Both limbs of the preopercle serrated along their outer edges, the other bones of the head and shoulder entire. *Teeth*—villiform. *Fins*—third dorsal spine is slightly the highest, and as long as the head behind the middle of the eye. The ventral does not reach the anal. Caudal notched. *Lateral-line*—tubes well developed, having lateral basal enlargements. *Colours*—greenish-brown with some dark spots on the head: a narrow blackish-brown band passes from the head to the root of the caudal fin, where it ends in a round black blotch: in its anterior half it is margined on either side by a bluish-white streak, which gradually decreases in width: there is a brownish blotch on the shoulder. The interspinous membrane between the second and third dorsal spines is black.

Habitat.—Nicobars, from whence Dr. Stoliczka brought the specimen which is figured: it is found in the Malay Archipelago.*

Genus, 12—Cheilodipterus, (*Lacép.*) *Cuv. & Val.*

Paramia, Bleeker.

Branchiostegals seven: pseudobranchiæ well developed. Opercles spineless: preopercle with a double edge, both

* **Apogon quinquevittatus.**

Blyth. P. A. S. of Bengal, 1858, p. 272.

D. 13/10, P. 15, A. $\frac{3}{9}$, V. 5, L. l. 24, L. tr. 3/10.

Eyes—diameter 2/5 of the vertical height of the head. Form compressed: mouth small. *Fins*—pectoral reaching beyond the second lateral band: the posterior dorsal and anal fins projecting similarly as far as the base of the tail fin. *Colours*—four vertical black bands, a fifth at the base of tail, and the occipital region also of this colour.

Habitat.—Andamans, about 1 inch in length. Unless some typographical error has occurred, this fish having three anal spines, &c., cannot be referred to *Apogon*.

of which, or the outer only, may be serrated. Villiform teeth in the jaws, vomer, and palate: canines present generally in both jaws and lateral canine-like ones. Two dorsal fins separated by an interspace, the first with six spines; the anal with two. Scales ctenoid, large and deciduous. Lateral-line distinct.*

Geographical distribution.—From the Red Sea and East coast of Africa, through the seas of India and the Malay Archipelago to the Pacific. Along the coasts of India they appear to be most abundant off Sind, and in the Andamans and Nicobars. The specimen of this genus recorded from the Coromandel coast of India, by Dr. Jerdon, in the 'Madras Journal Literature and Science' (1851, No. 39, p. 129) was, as I have already observed (p. 57), *Apogon multitæniatus*.

SYNOPSIS OF SPECIES.

1. *Cheilodipterus lineatus*, D. $6/\frac{1}{9}$, A. $\frac{2}{8}$, L. l. 26. Silvery-red with from seven to sixteen narrow black longitudinal bands, and a dark spot at the base of the caudal fin: first dorsal black between the second and third spines. Red Sea, East coast of Africa, and Sind.

2. *Cheilodipterus quinquelineatus*, D. $6/\frac{1}{9}$, A. $\frac{2}{8}$, L. l. 25. Similar to the last with five bands. Red Sea. Nicobars to the Malay Archipelago.

1. Cheilodipterus lineatus, Plate XVIII, fig. 8 and 9 (var. *Arabicus*).

Perca lineata, Forsk. Desc. Anim. p. 42, No. 43; Rüpp. N. W. Fische, p. 89.

Perca Arabica, Linn. Syst. Nat. p. 1312.

Cheilodipterus lineatus, Lacép. iii, p. 543, pl. xxxiv, fig. 1; Günther, Catal. i, p. 248; Klunz. Verh. z. b. Ges. Wien, 1870, p. 717.

Centropomus macrodon, Lacép. iv, p. 273.

Cheilodipterus octovittatus, Cuv. and Val. ii, p. 163; Klunz. Verh. z. b. Ges. Wien, 1870, p. 717.

Cheilodipterus Arabicus, Cuv. and Val. ii, p. 165, pl. 23.

Cheilodipterus heptazona, Bleeker, Perc. p. 29.

Paramia octolineata, Bleeker, Atl. Ich. Perc. t. xxvii, fig. 2, and Apogonini, p. 75.

B. vii, D. $6/\frac{1}{9}$, P. 13, V. 1/5, A. $\frac{2}{8}$, C. 17, L. l. 26-27, L. tr. $3\frac{1}{2}/7\frac{1}{2}$.

Length of head nearly 1/3, of caudal $4\frac{1}{2}$ to 1/5, height of body 1/4 in the total length. *Eyes*—diameter from $4\frac{1}{4}$ to 1/4 in length of head, 1 to $1\frac{1}{4}$ diameters from end of snout, and 3/4 to 1 diameter apart. The maxilla reaches to below the last third of the orbit. Vertical limb of preopercle very finely serrated in its outer edge, as is also that of the horizontal limb, where however the serrations are coarser and blunter; the other bones of the head entire. *Teeth*—canines in both jaws, and lateral canine-like ones. *Fins*—dorsal spines weak, the second and third of the same height and equal to two-thirds of that of the body. Pectoral reaches to above the anal spines: ventral two-thirds of the distance to the anal. Caudal forked. *Colours*—silvery-red, with horizontal bands along the head and body, the number of which appears to increase with age. In Sind some specimens had only seven, others as many as sixteen. One black band commencing above the snout proceeds to the base of the first dorsal fin: a second arising on the snout in common with that of the opposite side just anterior to the upper one and passes along the back above the lateral-line to the upper side of the caudal fin: the third commences on the side of the snout and passes through the eye, from the hind edge of which about four bands arise and are continued along the body: there are also generally two more from below the eye. A black spot exists at the base of the caudal fin, which is surrounded by a light edge. Fins red, the first dorsal black between the second and third spines. In adults intermediate bands appear between those described as existing in the young.

In the variety (fig. 9) which=*C. Arabicus*, C.V. it is bright yellow around the caudal blotch. The specimen came from Gwadar.

Habitat.—Red Sea, East coast of Africa, seas of India, Andamans to the Malay Archipelago and beyond.

2. Cheilodipterus quinquelineatus.

Cuv. and Val. ii, p. 167; Rüpp. N. W. Fische, p. 89; Lesson. Zool. Voy. Duperr. ii, p. 237; Bleeker. Mol. p. 252; Klunz. Verh. z. b. Ges. Wien, 1870, p. 716.

Apogon novemstriatus, Rüppell, N. W. Fische, p. 85, t. 22, f. 1.

Chilodipterus quinquelineatus, Günther, Catal. i, p. 248.

Paramia quinquelineata, Bleeker, Bouro, p. 147, Atl. Ich. Perc. t. xlviii, fig. 2, and Apogonini, p. 76.

B. vii, D. $6/\frac{1}{9}$, P. 15, V. 1/5, A. $\frac{2}{9}$, C. 17, L. l. 25, L. tr. 2/7.

Length of head about 2/7, of caudal 1/5, height of body 2/9 of the total length. *Eyes*—diameter 1/3 of length of head, 3/4 of a diameter from end of snout, and also apart. Vertical limb of preopercle serrated along its outer edge. *Teeth*—generic. *Fins*—dorsal spines weak, second and third of the same height, and about equal to half of that of the body. Caudal forked. *Colours*—with a reddish tinge having five black bands

* Bleeker has separated those species in which (although their dentition is similar) the scales are smaller and cycloid, and the caudal fin convex instead of emarginate, into a distinct genus, *Pseudamia*.

along the side: and a black spot surrounded by a yellow ocellus at the root of the caudal fin. It otherwise resembles the last species, of which it might be considered a variety.

Fifth group—Grystina.

Body oblong or elevated. Opercles entire or variously serrated. Cleft of mouth more or less oblique. One or two dorsal fins.

Genus, 13—Dules, *Cuv. and Val.*

Moronophis & Plectroplites, Gill: *Paradules*, pt. Bleeker.

Branchiostegals six: pseudobranchiæ. Eyes of moderate size. Chin moderately prominent. Preopercle serrated. Opercle with spines, but destitute of any membranous lobe. Villiform teeth in the jaws, vomer, and palatines, no canines. A single dorsal fin with ten spines, having a deep notch between the two last: anal with three spines. Scales ctenoid and of moderate size.

Geographical distribution.—From the Red Sea and East coast of Africa through the seas of India to the Malay Archipelago and beyond, being found in most intertropical seas, some being said to enter fresh waters.*

Uses.—Owing to their small size, these fishes are of but little economic value.

SYNOPSIS OF SPECIES.

1. *Dules marginatus*, D. $\frac{10}{11}$, A. $\frac{3}{10}$, L. l. 42. An oblique wide greyish band with an outer white margin across either caudal lobe: another along the top of the soft dorsal. Seas of India to the Malay Archipelago and beyond.

2. *Dules argenteus*, D. $\frac{10}{9\text{-}10}$, A. $\frac{3}{10\text{-}11}$, L. l. 52. A central black band on caudal fin and two oblique yellowish-black ones across either lobe: soft dorsal with a grey band along its upper edge, having a white outer margin. East coast of Africa, seas of India, to the Malay Archipelago and beyond.

1. Dules marginatus, Plate XVIII, fig. 1.

Cuv. and Val. iii, p. 116, pl. 52, and vii, p. 474; D'Urville, Voy. Pôle Sud. Poissons, p. 41, pl. iii, f. 3; Bleeker, Sumatra, i, p. 573; Günther, Catal. i, p. 268, and Fische d. Sudsee, p. 24.

Dules malo, Cuv. and Val. vii, p. 479; D'Urville, l. c. pl. iii, f. 4; Günther, Catal. i, p. 270.

Dules mato, Less. Voy. Coq. Zool. ii, p. 223.

Dules leuciscus, Jenyns, Voy. Beagle, Fishes, p. 17.

Kuhlia ciliata, Gill, Nat. Hist. Soc. Phil. 1861, p. 48.

Moronopsis ciliatus, Bleek. Arch. Néerl. 1872, p. 376, and Atl. Ich. Perc. t. xxxviii, f. 1, and l. c. t. xlvi, f. 2.

Paradules marginatus, Bleeker, Ceram. p. 257.

B. vi, D. $\frac{10}{11}$, P. 15, V. 1/5, A. $\frac{3}{10}$, C. 17, L. l. 42, L. tr. 5/8.

Length of head 2/7, of caudal 1/5, height of body 4/13 of the total length. *Eyes*—diameter 2/7 of length of head, 1 diameter from end of snout and also apart. The maxilla reaches to below the middle of the orbit. Preorbital very finely serrated along its lower margin, most distinctly so in the young. Horizontal limb of preopercle serrated. Opercle with two spines of which the lower is the longer. *Teeth*—villiform in jaws, vomer, and palatines. *Fins*—dorsal spines moderately strong, the fifth the highest and equal in length to the postorbital portion of the head, the tenth is longer than the ninth: third anal spine the longest: caudal moderately forked. *Colours*—greyish along the back, becoming silvery-white on the sides and abdomen; a greyish band, having a white tip, across the posterior third of the caudal fin: a similar but darker band, having a white upper edge, along the top of the soft dorsal: the other fins tinged externally with grey and edged with white.

Perca ciliata, (K. v. H.) Cuv. & Val.=*Percichthys ciliata*, (C. V.) Günther=this species according to Bleeker.

Habitat.—Seas of India, to the Malay Archipelago and beyond, attaining at least eight inches in length.

2. Dules argenteus, Plate XVIII, fig. 2.

Perca argentea, Bennett, Fish. Ceylon, p. 22, pl. 22.

Dules tæniurus, Cuv. and Val. iii, p. 114; Bleeker, Perc. p. 49: Günther, Catal. i, p. 267; Kner, Novara Fische, p. 47.

? *Dules Guamensis*, Cuv. and Val. vii, p. 474; D'Urville, l. c. p. 42, pl. 3, f. 1; Günther, Catal. i, p. 269.

Dules Bennetti, Bleeker, Bengal, p. 36; Peters, Wiegm. Arch. 1855, p. 238; Günther, Catal. i, p. 270.

Dules argenteus, Klunzinger, Verh. z. b. Ges. Wien, 1870, p. 730; Günther, Fische d. Sudsee, p. 25, t. xix, f. C.

Moronopsis tæniurus, (Gill) Bleeker, Arch. Néer. Sc. 1872, p. 374.

Paradules tæniurus, Bleeker, China, p. 139.

B. vi, D. $\frac{10}{9\text{-}10}$, P. 15, V. 1/5, A. $\frac{3}{10\text{-}11}$, C. 17, L. l. 52, L. tr. 6/12.

Length of head nearly 1/4, of caudal nearly 1/5, height of body 4/15 of the total length. *Eyes*—diameter 2/5 of length of head, 1/2 a diameter from end of snout, and 3/4 of a diameter apart. The maxilla reaches to below the first third of the orbit. Preorbital very finely serrated along its lower edge. Horizontal

* According to Mr. Garrett's observations in the *Fische d. Sudsee*, p. 24, these fishes appear sometimes to prefer fresh water to saline.

limb of preopercle regularly and evenly serrated. Opercle with two spines, the lower somewhat the longer. *Teeth*—villiform in jaws, vomer, and palate. *Fins*—dorsal spines not very strong, the fifth and sixth the highest, and equal to half the length of the head: second anal spine slightly shorter but stronger than the third: caudal forked. *Colours*—bluish, becoming silvery-white on the sides and abdomen, soft dorsal greyish-black along its upper third and having a white outer margin: caudal milk-white, with two oblique yellowish-black bands and a narrow central black longitudinal one.

Young—in a specimen $1\frac{1}{2}$ inches in length, taken at the Andamans, the colour differs from that of the adult;—body blue, with a narrow black longitudinal band passing from the upper edge of the orbit along the back, nearer to the base of the dorsal fin than the lateral-line, and ending in the lower of the two bands crossing the upper lobe of the caudal fin: a narrow black band runs along the bases of both dorsal fins, whilst each have black tips: the anal has a black mark on the front of its highest portion: caudal with one central band, and two oblique ones across either lobe.

Habitat.—East coast of Africa, seas of India to the Malay Archipelago and beyond: it attains six inches or more in length.

Sixth group—Theraponina.

Branchiostegals six. Opercle spinate: preopercle serrated. Cleft of mouth somewhat oblique. Dorsal fin single, but more or less notched: three anal spines. Air-vessel divided by a constriction into an anterior and posterior portion.

Genus, 14—Therapon,* *Cuv.*

Pelates, sp. Cuv.†

Branchiostegals six: pseudobranchiæ. Eyes of moderate size. Opercle with spines. Preopercle and sometimes preorbital serrated. Teeth villiform in both jaws, the outer row being sometimes the larger: deciduous ones on the vomer and palatines. Dorsal fin single, but more or less notched, having from eleven to thirteen spines: anal with three. Scales of moderate or small size. Air-vessel divided by a constriction. Pyloric appendages few or in moderate numbers.

Geographical distribution.—From the Red Sea and East coast of Africa through the seas of India to the Malay Archipelago and Australia. These fishes in India are almost strictly marine, but some are occasionally found in brackish water within tidal influence; and having entered during very high tides, or in the monsoon season, their return to salt water may be cut off, when they live in the brackish or even fresh water ponds until the return of the next spring tide or the succeeding year's monsoon. The *T. jarbua* is frequently captured in the Hooghly as high as Calcutta.

Uses.—Not esteemed as food, as they are reputed to feed on carrion, but they are eaten by the poorest class of natives.

The colour of these fish is usually silvery, with longitudinal bands, but in some species cross bands are present in the immature. This may especially be noticed in the *T. quadrilineatus*, whilst in the adult the only remnant existing of such is the black blotch on the shoulder, which originally formed a portion of the first body-band. As might be expected, the serrations and spines about the head vary with age: but it is worthy of special notice, that the sub- and inter-opercles may be serrated in some specimens and yet be entire in others, and this is most apparent in the *T. jarbua*. The existence of teeth on the vomer and palate appears to be often confined to the immature.

SYNOPSIS OF SPECIES.

1. *Therapon puta*, D. $\frac{11-12}{10}$, A. $\frac{3}{8-9}$, L. l. 90-100. Large teeth at preopercular angle. Four straight, longitudinal blackish-brown bands along the body: a dark blotch on the spinous dorsal, and two oblique bands across either caudal lobe. Seas of India to the Malay Archipelago.
2. *Therapon jarbua*, D. $\frac{10-12}{9-10}$, A. $\frac{3}{8-9}$, L. l. 80-90. Serrations at preopercular angle strong, but pretty even. Three longitudinal, convex, reddish-brown bands along the body: a dark blotch on the spinous dorsal: two oblique bands across either caudal lobe. Red Sea, East coast of Africa, seas of India, to the Malay Archipelago and beyond.
3. *Therapon quadrilineatus*, D. $\frac{11-12}{10}$, A. $\frac{3}{10}$, L. l. 70. Serrations at preopercular angle strong, but pretty even. Four or five horizontal blackish bands along the body: a black blotch on the spinous dorsal, another on the shoulder: no bands on the caudal. Seas of India to the Malay Archipelago and China.
4. *Therapon theraps*, D. $\frac{(10)-12}{(9)-10}$, A. $\frac{3}{8}$, L. l. 50-55. Evenly serrated on its preopercular angle. Three or four horizontal blackish-brown bands along the body: two across either caudal lobe. East coast of Africa, seas of India to the Malay Archipelago and beyond.

1. Therapon puta, Plate XVIII, fig. 3.

Perca keelputa, Russell, Fish. Vizag. ii, p. 19, pl. 126.

Therapon puta, Cuv. and Val. iii, p. 131, Règ. Anim. Ill. Poissons, pl. xii, fig. 2; Bleeker, Perc. p. 50.

* *Sabah-za*, Mugh.

† Bleeker divides this genus by adopting the following, with reference to their dentition, as sub-genera:
1. *Datnia*; teeth in jaws conical, entire, and in many rows.
2. *Pelates*; teeth in jaws conical, entire, in 3 rows in the upper and 2 in the lower jaw.
3. *Helotes*; teeth in the jaws in many rows, and tricuspidate.

Therapon ghebul, (Ehren.) Cuv. and Val. iii, p. 133; Bleeker, Perc. p. 51; Günther, Catal. i, p. 281; Klunz. Verh. z. b. Ges. Wien, 1870, p. 728.

Therapon trivittatus, Günther, Catal. i, p. 280; Day, Fish. Malabar, p. 17; Kner, Novara Fische, p. 45; Bleeker, Therapons, 1872, p. 375.

Kove keetchan, Tam. (Madras): *Keelputa*, Tel.: *Keetchan*, Tam. and Mal.

B. vi, D. $\frac{11-12}{10}$, P. 15, V. 1/5, A. $\frac{3}{8-9}$, C. 17, L. l. 90-100, L. tr. 13-14/24, Cæc. pyl. 7, Vert. 10/13.

Length of head 1/4 to $4\frac{1}{3}$, of caudal 1/5, height of body 1/4 in the total length. *Eyes*—diameter $3\frac{1}{3}$ to $3\frac{2}{3}$ in length of head, 1 diameter from end of snout, and 2/3 of a diameter apart. The maxilla reaches to below the anterior edge of the orbit. Preopercle with five or six strong denticulations on its vertical limb, the second above the lowest being generally the largest, whilst the two inferior are larger than the superior ones, the serrations are also continued along its horizontal limb. Sub- and inter-opercles entire. Opercle with two spines, the inferior the longest and strongest, and about equal to the largest of those on the preopercle. Shoulder-bone serrated (or crenulated), as is also the one in the axilla but more strongly so. *Teeth*—villiform in the jaws with an outer enlarged row, rudimentary ones present on the vomer and palate in the young, but lost as age advances. *Fins*—dorsal spines rather slender, the fourth to the sixth about equal and the longest, higher than the rays and equal to about 3/5 of the height of the body, from whence they decrease to the last but one, the last being a little higher. Pectoral as long as the head behind the middle of the eye. Second anal spine a little shorter than the third, which equals from 1/2 to 4/9 the height of the body: caudal emarginate. *Colours*—greyish, with three or four longitudinal straight blackish-brown bands: spinous portion of dorsal in its upper three quarters blackish between the third or fourth and seventh or eighth spines. Two oblique bands pass across the upper caudal lobe, and one, sometimes two, across its lower one. The *young* are similar to the adult, except that they look as if light spots were present along the interspace between the first three horizontal bands, giving the appearance of sinuous oblique dark bands.

Habitat.—Seas of India to the Malay Archipelago.

2. Therapon jarbua, Plate XVIII, fig. 4.

Sciæna jarbua, Forsk. Desc. Anim. p. 50; Gm. Linn. p. 1303; Shaw, Zool. iv, p. 541.

Holocentrus servus, Bloch, t. 238, f. 1.

Holocentrus jarbua, Lacép. iv, pp. 348, 355.

Grammistes servus, Bl. Schn. p. 185.

Coius trivittatus, Ham. Buch. Fish. Ganges, pp. 92, 370.

Therapon Timoriensis, Quoy and Gaim. Voy. Uran. Poiss. p. 341.

Therapon servus, Cuv. and Val. iii, p. 125, and vii, p. 479; Rüppell, N. W. Fische, p. 95; Bleeker, Perc. p. 50, and Atl. Ich. Perc. t. xxxiv, f. 2; Richards. Ann. and Mag. Nat. Hist. ix, p. 125; Günther, Catal. i, p. 278, and Fische d. Sudsee, p. 26; Day, Fish. Malabar, p. 18; Kner, Novara Fische, p. 45.

Pterapon trivittatus, Gray and Hardw. Ind. Zool. (from H. B. Mss.)

Therapon trivittatus, Cantor. Catal. p. 19.

Therapon jarbua, Klunzinger, Verh. z. b. Ges. Wien, 1870, p. 729.

Therapon (Datnia) jarbua, Bleeker, Therapons, 1872, p. 377.

Palin keetchan, Tam.: *Gahnu*, Ooriah: *Nga-sabasa-sa*, 'Paddy eating fish,' Arrac.: *Boorgooni* and *Jeerpȳe*, Beng-Chitt.

B. vi, D. $\frac{10-12}{9-10}$, P. 13, V. 1/5, A. $\frac{3}{8-9}$, C. 17, L. l. 80-90, L. tr. 15/30, Vert. 10/15.

Length of head from 3/11 to 1/4, of caudal 1/5, height of body $3\frac{1}{2}$ to $3\frac{2}{3}$ in the total length. *Eyes*—diameter $3\frac{1}{2}$ to 1/4 in length of head, 1 diameter from end of snout, and also apart. The maxilla reaches to below the first third of the orbit. Preorbital moderately serrated in the last two-thirds of its lower edge. Vertical limb of preopercle with from 12 to 14 serrations, the two at its rounded angle being much the strongest, along the lower limb are about eight weaker ones. Sub- and inter-opercles with fine serrations at their approximating edges, which may or may not be blunted with age, those from the Malabar coast appear to be the most strongly serrated. Upper opercular spine small, the lower large and strong, and its length equal to about two-thirds of the diameter of the orbit. Shoulder-bone, also the one in the axilla, serrated, very strongly so in the young. *Teeth*—an outer somewhat enlarged row in the jaws, fine ones likewise generally present on the vomer and palatines, more especially in the young. *Fins*—dorsal spines moderately strong, the third and fourth the longest, of about the same height and equal to half that of the body below them: second anal spine usually the strongest, and slightly shorter than the third: caudal forked. *Colours*—back bluish-grey, becoming white on the abdomen, with a tinge of gold along the cheeks and snout. Three longitudinal reddish-brown bands, having a slight convexity downwards, pass along the body: the upper from in front of the dorsal spines to the eighth or ninth: the second from the occiput to the end of the soft dorsal having reached the lateral-line in its concave course: the third from the back of the head to the lower opercular spine, and continued in a curved direction to the centre of the caudal fin. Sometimes a fourth band is present along the abdomen. Ventral and anal with a yellow tinge along their centres. Dorsal interspinous membrane milk-white, with a black mark in its upper two-thirds between the third and sixth spines: a second commences at the eighth spine, and is continued along the whole base of the soft dorsal: upper edge of first three dorsal rays tipped with black: caudal with two oblique bands across each lobe: eye yellowish-red.

In the *young* there are two strong spines at the preopercular angle.

Dr. Klunzinger, *l.c.* observes upon having only found 10 spines in the first dorsal fin. Dr. Günther. 'Fische d. Sudsee,' p. 26, in answer to this, remarks that during a London fog he has found 11. I may complete the discussion by stating that in my collection I have specimens representing both numbers.

Col. Tickell, MS. remarks that this fish is termed the Paddy or rice eater in Arracan, in consequence of the young being so frequently found in the inundated rice or paddy-fields.

Habitat—From the Red Sea and East coast of Africa through the seas and estuaries of India to the Malay Archipelago and north coast of Australia. It is a common fish, attaining 12 or 13 inches in length. Hamilton Buchanan left an excellent figure of this fish illustrative of his *Coius trivittatus:* it is labelled *Holocentrus katkaya*, and was reproduced by General Hardwicke. The species is not uncommon at Calcutta in the tidal Hooghly, whilst the *T. puta*, to which Buchanan's description has been referred, does not appear to ascend so high, although I have taken it, along with other marine fishes, in the Sunderbunds.

3. **Therapon quadrilineatus**, Plate XVIII, fig. 5.

Holocentrus quadrilineatus, Bloch, t. 238, fig. 2.

Pristipoma sexlineatum, Quoy and Gaim. Voy. Freyc. Poiss. p. 320.

Therapon quadrilineatus, Cuv. and Val. iii, p. 134; Richards. Ich. China, p. 239; Bleeker, Perc. p. 51; Günther, Catal. i, p. 282; Kner, Novara Fische, p. 46.

Therapon xanthurus, Cuv. and Val. iii, p. 135.

Pelates sexlineatus, quadrilineatus, et *quinquelineatus*, Cuv. and Val. iii, p. 146, pl. 55; Less. Voy. Coq. ii, p. 223; Cuv. Reg. An. Illus. Poiss. pl. xii, fig. 1; Griff. An. King. Fish. t. xii, fig. 1.

Helotes polytænia, Bleeker, Halmah, p. 53 and Atl. Ich. Perc. t. xxvi, f. 1.

Therapon Cuvieri, Bleeker, Timor, p. 211; Günther, Catal. i, p. 282.

Therapon sexlineatus, Steindach. Fischf. Port Jackson, Sitz. Ak. Wiss. liii, p. 429.

Therapon (Pelates) quadrilineatus, Bleeker, Therapons, 1872, p. 389.

B. vi, D. $^{11-12}\frac{1}{10}$, P. 15, V. 1/5, A. $\frac{3}{10}$, C. 17, L. l. 70, L. tr. 13/26, Cæc. pyl. 18.

Length of head 1/4, of caudal 1/6, height of body 1/4 of the total length. *Eyes*—diameter 1/3 of length of head, 2/3 of a diameter from end of snout, and also apart. The maxilla reaches to below the front edge of the orbit. Preorbital slightly serrated on its lower border. Preopercle serrated along both limbs, coarsest at its rounded angle, becoming indistinct along its horizontal limb. Sub- and inter-opercles entire. Opercle with two rather weak spines. Shoulder-bone entire, that in the axilla serrated. *Teeth*—villiform in 3 rows in the upper and two in the lower jaw, and having the external row in the maxilla enlarged. *Fins*—dorsal spines moderately strong, becoming highest about the fifth, which equals half the height of the body below it: second anal spine strongest, the third the longest: caudal emarginate. *Pyloric appendages*—very short. *Colours*—silvery, with five horizontal black bands, the first to the anterior portion of the soft dorsal: the second to the end of its base: the third to the upper third of the base of the caudal: the fourth to its lower third: the fifth (sometimes absent) to the end of the base of the anal. A large black blotch on the shoulder. Dorsal fin with a black blotch between its third and seventh spines, a black mark along the middle of the soft dorsal, and a black tip. Pectoral canary colour, as is also the ventral and anal, the last of which is darkest externally, and has a dark basal band: caudal yellowish with a dark edge but no bands.

The *young* have six light vertical cross bands, four times as wide as the ground colour, passing from the back to the fourth horizontal band; they are distinct in the specimens up to $3\frac{1}{2}$ inches in length. The black shoulder blotch in the adult is the upper portion of the first body band.

Habitat.—Seas of India to the Malay Archipelago and China; attaining at least 6 inches in length.

4. **Therapon theraps**, Plate XVIII, fig. 6.

Therapon theraps, Cuv. and Val. iii, p. 129, pl. 53; Bleeker, Perc. p. 50, and Atl. Ich. Perc. t. xliii, fig. 1; Richards. Ann. Nat. Hist. 1842, p. 126; Rüpp. N. W. Fische, p. 95; Günther, Catal. i, p. 274, and Fische d. Sudsee, p. 26; Day, Fish. Malabar, p. 19; Kner, Novara Fische, p. 44; Klunz. Verh. z. b. Ges. Wien, 1870, p. 728.

Therapon obscurus, Cuv. and Val. iii, p. 135; Cantor, Catal. p. 20; Günther, Catal. i, p. 275.

Therapon squalidus, Cuv. and Val. iii, p. 136 (Cæc. pyl. 13?); Günther, Catal. i, p. 275.

Therapon transversus, Cuv. and Val. iii, p. 136 (Cæc. pyl. 11?)

Therapon cinereus, Cuv. and Val. iii, p. 138 (Cæc. pyl. 10?); Günther, Catal. i, p. 276.

? *Datnia virgata*, Cuv. and Val. vii, p. 480.

? *Therapon rubricatus*, Richards. Ann. Nat. Hist. 1842, p. 127.

? *Therapon virgatus*, Günther, Catal. i, p. 276.

Therapon (Datnia) theraps, Bleeker, Therapons, 1872, p. 379.

Kutta keetchan, Tam.

B. vi, D. $\frac{(10)}{(9)}\frac{12}{10}$, P. 15, V. 1/5, A. $\frac{3}{8}$, C. 17, L. l. 50-55, L. r. $\frac{55-56}{50-52}$, L. tr. 11/16, Vert. 10/15, Cæc. pyl. (7 Kner.)

Length of head 1/4, of caudal 2/11 to 1/5, height of body 2/7 of the total length. *Eyes*—diameter $3\frac{1}{4}$ to $3\frac{1}{2}$ in length of head, 1 diameter from end of snout, and also apart. The maxilla reaches to below the first

third of the orbit. Preorbital very finely serrated on its lower edge in the adult but more distinctly in the young. Preopercle nearly evenly serrated, most coarsely at its angle: sub- and inter-opercles entire, in some of the young they are rough or even serrated at their approximating edges. Lower opercular spine the longer, about 2/3 as long as the orbit, but not equalling the length of *T. jarbua*. *Teeth*—villiform in the jaws, with an outer somewhat enlarged row: deciduous ones present in the young on the vomer and said also to exist on the palate. Shoulder-bone serrated, and two or three strong spines on the bone at the axilla. *Fins*—dorsal spines moderately strong, the fourth slightly the longest and equal to half the height of the body below it, their length decreases to the last but one, which is only two-thirds or three-fourths as high as the last: second anal spine the strongest, but rather shorter than the third: caudal emarginate. *Scales*—above the lateral-line a little smaller than those below it. *Colours*—silvery, with four horizontal blackish-brown lines, the first from the second to the last dorsal spine leaving a narrow yellow intervening space between them: the second from the nape to the last few dorsal rays, and ending by being continued on to the fin as well as joining the line below it: the third (which is often the last) from the snout to upper part of the tail: the lowest (often absent) from the base of the pectoral to the lower caudal lobe. Dorsal fin with a black blotch between its third and its seventh spines, and a dark band along the upper portion of the rays. An horizontal black band along the first half of the anal fin. Caudal with two oblique bands across its lower lobe, and two also across its upper, the superior of which is interrupted in the adult, the lobe has likewise a black tip.

In the *young* the colours are much darker, and due to innumerable fine brown spots they appear as if they were dark with two light bands only half the width of the darker ones. The anal fin has two large black spots, one on the interspinous membrane and continued on to the first three rays: the second is confined to the last three rays. A large black shoulder spot is sometimes visible. There are teeth on the vomer.

Variety.—In a small specimen from Madras, $2\frac{1}{5}$ inches long, there are D. $\frac{10}{9}$, the two first spines apparently being absent, it is otherwise identical with the young of this species.

Therapon cinereus (Cuv. and Val.) Günther in the British Museum is this species, in which the bands, though very faint, may still be traced: as the condition of the specimen is good, either it must have been somewhat of an albino variety, or else it has been kept in such a light that etiolation has resulted.

Habitat.—East coast of Africa, seas of India, through the Malay Archipelago to China, attaining at least six inches in length.

Genus, 15—DATNIA, *Cuv. and Val.*

Mesopristis, sp. Bleeker.

Branchiostegals six: pseudobranchiæ. Body elevated, with a somewhat rectangular or concave profile: snout pointed and somewhat produced. Eyes of moderate size. Opercle with spines: preopercle serrated. Teeth villiform in both jaws: palate edentulous. Dorsal fin single, but slightly notched, spines strong (12-13) and occupying a considerable amount of the length of the fin: anal with three spines. Scales of moderate size.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Datnia argentea*, D. $\frac{12}{10}$, A. $\frac{3}{8}$, L. l. 56. Second anal spine strong. Seas of India to the Malay Archipelago.

Datnia argentea, Plate XVIII, fig. 7.

Datnia argentea. Cuv. and Val. iii, p. 139, pl. 54; Bleeker, Perc. p. 52.
Mesopristis macracanthus, Bleeker, Batavia, p. 523.
Datnia cancelloides, Bleeker, Sumatra, p. 247 (*young*).
Therapon argenteus, Günther, Catal. i, p. 283.
Therapon (Datnia) argenteus, Bleeker, Therapons, 1872, p. 382 (not Kner.)

B. vi, D. $\frac{12}{10}$, P. 14, V. 1/5, A. $\frac{3}{8}$, C. 17, L. l. 56, L. tr. 30-35, Cæc. pyl. 11.

Length of head 1/4, of caudal 1/5, height of body 1/3 to $3\frac{1}{4}$ in the total length. *Eyes*—diameter 1/4 of length of head, $1\frac{1}{4}$ diameters from end of snout, and 4/5 of a diameter apart. The maxilla does not quite extend to beneath the anterior edge of the orbit. Snout pointed. Preorbital serrated along the last half of its lower edge. Preopercle serrated along its vertical margin. *Teeth*—villiform in jaws, none on the palate. *Fins*—fourth and fifth dorsal spines the longest and rather more than half the height of the body: second anal spine very strong, longer than the third, and exceeding the length of the longest in the dorsal fin: caudal notched. *Colours*—silvery, darkest along the back: a narrow black outer edge to the dorsal fin: a band along the middle of the anal, which also has a dark margin.

The *young* appear to have longitudinal bands.

As Cuvier observes, this fish has a more elevated body than in the typical *Therapons*, a somewhat concave profile, and pointed snout, the dorsal spines being stronger and their bases occupying a comparatively greater extent of the back than the rays, and there being a very slight notch between the last two. In fact it is his first species of *Datnia*, a genus which some Ichthyologists consider ought not to be retained.

Habitat.—Cape seas, seas of India to the Malay Archipelago and beyond. I never obtained it in India, saw it in a local collection there, or observed any figure of it amongst drawings of Indian fishes, but as it is found in the Malay Archipelago, stray ones may very possibly be occasionally captured on the coast of India.

Genus, 16—Helotes, *Cuv.*

Branchiostegals six. Eyes of moderate size. Cleft of mouth rather small, jaws nearly equal in front. Preopercle serrated: opercle with weak spines. The outer row of teeth in the jaws having a small lobe on each side: palate edentulous. Dorsal fin single, not deeply notched, having twelve spines; anal with three. Scales small, ctenoid. Air-vessel divided by a constriction into an anterior and posterior portion. Pyloric appendages in moderate numbers.

Geographical distribution.—Ceylon* ? to the Malay Archipelago and beyond.

Sixth group—Pristipomatidæ.

Branchiostegals from five to seven. Preopercle serrated or entire. Mouth moderately protractile. Teeth in the jaws. Three anal spines. Air-vessel destitute of any constriction.

Genus, 17—Pristipoma, *Cuv.*

Genytremus, *Genyatremus*, *Anisotremus* and *Pristocantharus*, Gill: *Hæmulopsis*, Steind.

Branchiostegals seven: pseudobranchiæ. Body oblong, compressed. Eyes of moderate size. Cleft of mouth horizontal: gape not very wide: premaxillaries moderately protusible: jaws of nearly equal length: a central longitudinal and deep groove below the symphysis of the lower jaw, and two small open pores under the chin: no barbels. Preopercle serrated: opercle with indistinct points. Teeth in the jaws villiform without canines: palate edentulous. Dorsal with from eleven to fourteen spines, and sometimes having a deep notch between the last two: anal with three spines. Vertical fins scaleless or only so along their bases. Scales ctenoid and of moderate or small size, present on the head, including the preorbital and lower jaw. Air-vessel simple, destitute of any constriction. Pyloric appendages few.

Geographical distribution.—All tropical seas and likewise found in the Mediterranean: the young of the Indian species are often taken in backwaters.

Uses.—Fair as food but not much esteemed: the air-vessel in some places collected as isinglass. Many breed about April or May.

SYNOPSIS OF SPECIES.

1. *Pristipoma stridens*, D. $\frac{12}{15 \mid 16}$, A. $\frac{3}{9}$, L. r. $\frac{95-100}{80-85}$. Purplish on the back, becoming white on the abdomen. Three golden bands along the body and a dark mark on the upper third of the opercle. Red Sea, along the Meckran coast to Sind.

2. *Pristipoma olivaceum*, D. $\frac{12}{15}$, A. $\frac{3}{12}$, L. r. $\frac{66}{54}$. Olive-grey, the head glossed with purple: a black mark on the opercle. Beloochistan and Sind.

3. *Pristipoma furcatum*, D. $\frac{12-13}{15}$, A. $\frac{3}{8-9}$, L. l. 55-60. Silvery, with six sinuous blackish-brown bands, three of which are above the lateral-line: a dark mark on the opercle: spinous dorsal with three rows of brown spots and a dark edge: upper half of dorsal dark, and a band along the anal. Seas of India to the Malay Archipelago.

4. *Pristipoma hasta*, D. $\frac{12}{13-14}$, A. $\frac{3}{7-8}$, L. l. 45-50. Four or five lines of dark grey along the sides, sometimes coalescing and forming bands: two or three rows of spots along the dorsal fin. Red Sea, East coast of Africa, seas of India to the Malay Archipelago and beyond.

5. *Pristipoma Commersonii*, D. $\frac{12}{14}$, A. $\frac{3}{7}$, L. l. 50. Sinuous rows of black dots over upper two-thirds of body, and several rows along the dorsal fin. Madras.

6. *Pristipoma maculatum*, D. $\frac{12}{(11)-14}$, A. $\frac{3}{7}$, L. l. 52-56. Greyish, becoming white beneath: a black band over the nape, and six black blotches along the side, three above and three below the lateral-line, not forming bands but placed like squares on a chess board. Red Sea, East coast of Africa, through the seas of India to the Malay Archipelago and beyond.

7. *Pristipoma Dussumieri*, D. $\frac{12}{14}$, A. $\frac{3}{7}$, L. l. 50-54. Greyish, becoming lighter below: two golden lateral bands: fins with dark edges. Seas of India.

8. *Pristipoma guoraka*, D. $\frac{12-13}{13-14}$, A. $\frac{3}{7-8}$, L. l. 45-47. Silvery, an olive spot on the opercle. Seas of India to the Malay Archipelago.

9. *Pristipoma operculare*, D. $\frac{11}{14}$, A. $\frac{3}{9}$, L. l. 57. Silvery, with a black blotch at the posterior-superior angle of the opercle: upper half of the body with numerous black spots, sometimes forming undulating bands: a dark spot at the base of each dorsal spine and ray. East coast of Africa to Sind.

1. Pristipoma stridens, Plate XVIII, fig. 8.

Sciæna stridens, Forsk. p. 50.

Perca stridens, Bl. Schn. p. 87.

Pristipoma simmena, Cuv. and Val. v, p. 260.

Pristipoma stridens, Rüppell, N. W. Fische, p. 122, t. 31, f. 1; Günther, Catal. i, p. 300; Klunzinger, Fische Roth. Meeres, Verh. z. b. Ges. Wien, p. 732.

* In the list of the Acanthopterygian fishes of Ceylon, prepared by Dr. Günther (Sir E. Tennent's Nat. Hist. of Ceylon, 1861, p. 360), is *Helotes polytænia* Bleeker, as that species = *Therapon quadrilineatus*, I conclude that Dr. Günther's species, which I have not seen, may be identical.

B. vii, D. $\frac{12}{13-16}$, P. 17, V. 1/5, A. $\frac{3}{9}$, C. 17, L. r. $\frac{95-100}{80-85}$, L. tr. 8-9/18, Cæc. pyl. 5-6.

Length of head 1/4, of caudal 1/6, height of body 1/4 of the total length. *Eyes*—diameter 2/7 to 1/4 of length of head, 1 to $1\frac{1}{4}$ diameters from end of snout, and 1 apart. Upper profile of head somewhat rounded: jaws of about equal length. The maxilla reaches to below the front edge or first third of the orbit. Vertical margin of preopercle oblique, angle rounded, serrated in its whole extent, its two or three lowest serrations the strongest: horizontal limb entire, as are also the sub- and inter-opercles. Shoulder-bone serrated. *Teeth*—villiform in jaws, the outer row being slightly the largest. *Fins*—dorsal interspinous membrane moderately notched, the spines slender, the fifth the highest and half as long as the head. Pectoral as long as the head without the snout. Second anal spine stronger than, but not quite so long as the third, which equals 4/11 of the height of the body: caudal forked in its last third. *Colours*—they much resemble those of a *Therapon*, purplish on the back becoming dirty white on the abdomen, a golden band from the occiput to the end of the base of the soft dorsal: a second from the shoulder passes along the lateral-line to be lost on the summit of the free portion of the tail: a third from the eye to the middle of the caudal fin: a dark mark at the upper third of the opercle: dorsal interspinous membrane covered with fine black spots, outer edge and also that of the caudal and anal stained grey: many fine dots over the head and body.

Variety.—At Aden I procured a variety of this species, which was nearly black, from the numerous dark spots all over it.

Habitat.—Red Sea, along the Meckran coast, and very common at Kurrachee in Sind: attaining at least 6 inches in length.

2. **Pristipoma olivaceum**, Plate XIX, fig. 1.

B. vii, D. $\frac{12}{15}$, P. 17, V. 1/5, A. $\frac{3}{12}$, C. 17, L. l. 55, L. r. $\frac{66}{54}$, L. tr. 9/15, Cæc. pyl. 6.

Length of head 4/15 to 1/4, of caudal 2/11 to 1/6, height of body 3/10 to 1/3 of the total length. *Eyes*—diameter 2/7 to 1/4 of length of head, 1 diameter from end of snout, and $1\frac{1}{4}$ apart. Dorsal profile more convex than that of the abdomen: body compressed. The maxilla reaches to below the posterior nostril or even front edge of the eye. Vertical limb of preopercle emarginate, its angle rounded, and the whole strongly serrated: a deep groove below and behind the symphysis of the lower jaw and two open pores. *Teeth*—villiform in both jaws: the outer row rather the largest. *Fins*—dorsal spines, the fourth the highest and equal to half the length of the head, the interspinous membrane notched. Pectoral pointed and nearly as long as the head: second anal spine the strongest, and nearly as long as the third which equals the eighth of the dorsal fin. Caudal emarginate. *Scales*—in oblique rows above and horizontal ones below the lateral-line. *Cæcal appendages*—six which are rather long and enlarged at their extremities. *Colours*—olive-grey, the head glossed with purple, a large black blotch bordered in front with yellow at the upper angle of the opercle: pectoral yellow, as is also the ventral in its front half, whilst its posterior portion is black with a white edge: the other fins stained with blackish and having fine deep brown dots. Eyes golden.

Habitat.—Coasts of Beloochistan and Sind, attaining at least a foot in length (the specimen figured is a little over 8 inches long). It appears to be common during the cold months.

3. **Pristipoma furcatum**, Plate XIX, fig. 2.

Grammistes furcatus, Bl. Schn. p. 187, t. 43.

Perca paikeeli, Russell, Fish. Vizag. ii, p. 16, pl. 121.

Pristipoma paikeeli, Cuv. and Val. v, p. 259; Cantor, Catal. p. 74; Bleeker, Verh. Bat. Gen. xxiii, Sciæn. p. 20; Günther, Catal. i, p. 292.

Pristipoma furcatum, Bleeker, Revis. Pristipoma, 1873, p. 304, (not Agass).

Paikeeli, Tel.: *Kullu-korake*, Tam.

B. vii, D. $\frac{12-13}{15}$, P. 17, V. 1/5, A. $\frac{3}{8-9}$, C. 17, L. l. 55-60, L. tr. 7/18.

Length of head from 1/4 to 4/17, of caudal 1/6, height of body 1/3 of the total length. *Eyes*—diameter from $3\frac{1}{3}$ to $4\frac{1}{4}$ in length of head, from 1 to $1\frac{1}{3}$ diameters from end of snout and also apart. A deep groove under the symphysis of the lower jaw and two open pores. The maxilla reaches to below the anterior nostril. Preopercle serrated, most strongly so at its somewhat produced angle. *Teeth*—in villiform rows, with an outer enlarged one in the upper jaw, and a slightly enlarged one in the lower jaw. *Fins*—third or fourth dorsal spine the highest and equal in length to the head behind the middle of the eye, or $2\frac{3}{4}$ in the height of the body, every alternate one being broader. Pectoral a little longer than the head: ventral does not reach the anal. Second anal spine much the strongest and also the longest, being higher than the fourth of the dorsal fin and about 1/2 as high as the body: caudal notched. *Colours*—silvery with six horizontal brownish-black bands, darkest externally, three of which are above the lateral-line: spinous portion of the dorsal fin with three rows of brown spots and a dark edge: upper half of soft dorsal dark: a dark band along the anal.

Bloch Schneider's specimen, a little over 7 inches in length, is still preserved in the Berlin Museum, leaving no doubt as to its identity with the *paikeeli* of Russell.

Habitat.—Seas of India to the Malay Archipelago. The specimen figured is 6 inches long and from Madras, there is a stuffed one from the same locality in the India Museum, 11 inches in length.

4. **Pristipoma hasta**, Plate XIX, fig. 3, and 4 (young $\frac{2}{1}$).

Lutjanus hasta, Bl. t. 246, f. 1.

Coius gudgutia, Ham. Buch. p. 94, 370.
Pristipoma kaakan, Cuv. and Val. v, p. 244; Rüppell, N. W. Fische, p. 123.
Pristipoma Commersonii, Cantor, Catal. p. 72.
Pristipoma hasta, Cuv. and Val. v, p. 247; Günther, Catal. i, p. 289; Day, Fishes of Malabar, p. 20; Klunzin. Verh. z. b. Ges. Wien. 1870, p. 733; Bleeker, Revis. Pristip. 1873, p. 308.
Pristipoma chrysobalion, (K. and v. H.) Cuv. and Val. v, p. 248.
Mesoprion gutgutia, (Cuv. and Val.) Blyth, Proc. A. S. of Bengal, 1860, p. 111.
Polotus nitidus, Blyth, Proc. A. S. of Beng. 1858, p. 283, & 1860, p. 111.
Coroua and *Corake*, Tam.: *Coompoo*, Bel.

B. vii, D. $\frac{12}{13\text{-}14}$, P. 17, V. 1/5, A. $\frac{3}{7\text{-}8}$, C. 17, L. l. 45-50, L. tr. 7/10, Cæc. pyl. 6-7.

Length of head 1/3 to 2/7, of caudal 1/5 to 1/6, height of body 1/3 to 3/10 of the total length. *Eyes*—diameter from 1/3 to 1/5 of length of head, from 2/3 to $1\frac{1}{3}$ diameters from end of snout and also apart. The maxilla reaches to beneath the anterior edge or even first third of the orbit. Preopercle emarginate posteriorly, its angle rounded and produced, serrated in its whole extent, very coarsely so at its angle, and most distinctly so in the immature. Opercle with two rounded points. Shoulder bone serrated. *Teeth*—villiform, outer row somewhat the largest. *Fins*—dorsal spines strong, the third or fourth the longest and equal to 1/2 the height of the body, from it they decrease to the 11th which equals 2/3 the height of the second, whilst the 12th is almost 1/3 longer. Pectoral nearly as long as the head: ventral reaches 2/3 of the way to the anal. Second anal spine longest and strongest, equalling 1/2 of the height of the body and longitudinally fluted, the 3rd thinner and 1/4 shorter. Caudal emarginate. *Colours*—four or five interrupted lines of grey along the sides, three or four being above the lateral-line: sometimes they coalesce and form bands. Two or three rows of spots along the dorsal fin, and in the adult a single row of dull blotches at the base of the fin.

Habitat.—Red Sea, East coast of Africa, seas of India, Malay Archipelago to North Australia, attaining $1\frac{1}{2}$ feet or more in length.

The specimen from which fig. 3 is taken is 7 inches long, whilst fig. 4 of one of the young is twice the natural size, it shows how with age the length of the last dorsal spines comparatively decrease to the size of the fish.

5. **Pristipoma argenteum**, Plate VIII, fig. 3.*

Sciæna argentea, Forsk. p. 51.
? *Anthias lineatus*, Bl. t. 326, f. 1.
? *Labrus Commersonii*, Lacép. iii, pp. 431, 477, t. xxiii, fig. 1: Shaw, Zool. iv, p. 493.
? *Lutjanus microstoma*, Lacép. iv, pp. 181, 216, and iii, t. xxxiv, f. 2.
? *Pristipoma Commersonii*, Cuv. and Val. v, p. 252.
Pomadasis argenteus, Lacép. iv, p. 516.
Pristipoma argenteum, Cuv. and Val. v, p. 249; Günther, Catal. i, p. 291.

B. vii, D. $\frac{12}{14}$, P. 15, V. 1/5, A. $\frac{3}{7}$, C. 17, L. l. 50, L. tr. 5/13.

Length of head 2/7, of caudal 2/13, height of body 3/10 of the total length. *Eyes*—diameter $3\frac{1}{3}$ in the length of head, 1 diameter from end of snout, and 2/3 of a diameter apart. The maxilla reaches to below the front edge of the eye. Preopercle serrated along its vertical limb and angle. Shoulder bone serrated, the one in the axilla entire. A deep groove under the symphysis of the lower jaw, and two small open pores anterior to it. *Teeth*—villiform, with the external row enlarged, most distinctly so in the upper jaw. *Fins*—dorsal spines of moderate strength, each alternate one thicker on one side, first short, second nearly twice its height but only half of the third which equals 3/7 of the height of the body, the fourth is nearly as high and the rest gradually decrease to the eleventh which equals the height of the second, the twelfth is a very little longer but more than 1/2 the height of the rays. Pectoral as long as the head: ventral almost reaches the anal. First anal spine short, the second moderately strong, having a raised keel along its anterior surface, and being nearly 1/2 as high as the body: third spine much weaker, and a little more than 1/3 shorter. *Lateral-line*—tubes expand posteriorly into a wedge-shape. Free portion of tail about as long as high. *Colours*—silvery, covered with black spots in the upper two-thirds of the body forming sinuous lines: a dark spot on the opercle. A row of basal spots along the dorsal fin, two more above it in the spinous portion, and a dark line along the soft fin.

This species has a less deeply cleft dorsal fin than is seen in *P. hasta* (except in the very young); irrespective of which it also differs from it or *P. nageb*, in its more obtuse snout, &c.

Habitat.—Red Sea and seas of India.

6. **Pristipoma maculatum**, Plate XIX, fig. 5.

Anthias maculatus, Bloch, t. 326, f. 2; Bl. Schn. p. 306.
Lutjanus maculatus, Lacép. iv, p. 233.
Perca caripe, Russell, Fishes Vizag, ii, p. 18, pl. 124.
Pristipoma caripa, Cuv. and Val. v, p. 261; Rüpp. N. W. Fische, p. 124; Cantor, Catal. p. 75; Bleeker, Sciæn. p. 21.
Pristipoma maculatum, Günther, Catal. i, p. 293; Day, Fishes of Malabar, p. 21; Kner, Novara Fische, p. 52; Klunzinger, Verh. z. b. Ges. Wien, 1870, p. 735; Bleeker, Rev. Pristip. 1873, p. 306.

* Marked *Pristipoma Commersonii*, on the plate.

Caripe, Tel.: *Erruttum corah*, Mal.: *Currutche*, Tam.

B. vii, D. $\frac{12}{(11)-14}$, P. 17, V. 1/5, A. $\frac{3}{7}$, C. 17, L. l. 52-56, L. tr. 8/12, Cæc. pyl. 6.

Length of head 2/7, of caudal 1/6, height of body 1/3 to nearly 4/13 of the total length. *Eyes*—diameter 2/7 to 1/4 of length of head, $1\frac{1}{4}$ diameters from end of snout, and also apart. Maxilla extends to nearly or quite below the anterior edge of the orbit. Vertical limb of preopercle slightly emarginate and finely serrated, angle rounded and having two or three very small serrations; inferior limb crenulated or entire. Shoulder-bone entire. *Teeth*—villiform in the jaws, the outer row slightly the largest. *Fins*—fourth dorsal spine the highest, equalling the length of the postorbital portion of the head. Pectoral as long as the head: ventral does not reach the anal. Second anal spine a little longer and much stronger than the third, it equals 1/3 the height of the body: caudal emarginate. *Scales*—in oblique rows above the lateral-line and horizontal ones below it. *Colours*—greyish, becoming white beneath, and having a purplish tinge about the head: a blackish band over the snout: a second from the occiput touches the posterior edge of the orbit, and descends over the opercles. A vertical black band, about eight scales wide, passes over the nape and terminates about three scales below the lateral-line: posterior to this are six black blotches, three or four above, and two or three below the lateral-line, not forming bands, but placed like squares on a chess board. Spinous dorsal with a large black mark between its fourth and seventh or even eighth spines: soft dorsal with a dark band along its centre, and both dorsals with their edges stained black, as is also the caudal.

In *young specimens*, as $2\frac{2}{10}$ inches in length, the preopercle is strongly serrated along its vertical border: at $3\frac{1}{2}$ the serrations are still strong: at $4\frac{1}{2}$ there is but slight difference, whilst at $6\frac{1}{2}$ they are even less apparent.

Abnormal development.—In one specimen an extra spine is developed on one side of the second spine of the dorsal fin.

Habitat.—From the Red Sea and East coast of Africa, through the seas of India to the Malay Archipelago and New Guinea: it attains at least 16 inches in length: the specimen figured is 9 inches long.

7. Pristipoma Dussumieri, Plate XIX, fig. 6.

Cuv. and Val. v, p. 259; Günther, Catal. i, p. 291.

Pristipoma Neilli,* Day, Proc. Zool. Soc. 1867, p. 936.

Cut-tah-lee, Tam.

B. vii, D. $\frac{12}{14}$, P. 15, V. 1/5, A. $\frac{3}{7}$, C. 19, L. l. 50, L. r. $\frac{54}{52}$, L. tr. $6\frac{1}{2}$/15.

Length of head 1/4, of caudal 1/5, height of body rather more than 1/3 of the total length. *Eyes*—diameter 1/3 of length of head, nearly 1 diameter from end of snout, and 3/4 of a diameter apart. Jaws of about equal length anteriorly. The maxilla extends to nearly beneath the front edge of the orbit. Preopercle having its vertical limb slightly emarginate, its rounded angle being a little produced, and the whole serrated but most coarsely so at the angle, its horizontal limb with a few serrations along its posterior portion. *Teeth*—villiform in the jaws. *Fins*—dorsal spines strong, every alternate one being broader, interspinous membrane slightly notched, the fourth spine the longest and equal to two-fifths of the height of the body: pectoral as long as the head: ventral does not reach the anal, its first ray with a filamentous prolongation: second anal spine strong, one-fourth longer than the third, and equal to two-thirds the length of the head: caudal emarginate, being deeply lunated. *Colours*—greyish, becoming white on the abdomen: a brilliant golden band passes from the eye to the base of the caudal fin, a second above it runs along a few rows of scales. Fins silvery dashed with gold, a dark band along the base of the dorsal and its spinous portion with a black margin: upper portions of soft dorsal and the last half of spinous dorsal dark grey. Stuffed specimens lose their golden bands and appear uniform.

Habitat.—Seas of India. more common on the East than on the West coast, but nowhere numerous. Jerdon only obtained it on the Malabar coast (Madr. Journ. Lit. and Science, 1851, p. 132.)

8. Pristipoma guoraka, Plate XX, fig. 1.

? *Perca grunniens*, Forst. p. 294.

? *Anthias grunniens*, Bl. Schn. p. 308.

Perca guoraka, Russell, Fish. Vizag. ii, p. 24, pl. 132.

Pristipoma guoraka, Cuv. and Val. v, p. 256; Cantor, Catal. p. 73; Bleeker, Sciæn. p. 23, and Revis. Prist. 1873, p. 315, and Atl. Ich. Perc. t. xlv, fig. 1; Day, Fishes Malabar, p. 22; Kner, Novara Fische, p. 53.

Pristipoma argyreum, Cuv. and Val. ix, p. 485; Bleeker, Sciæn. p. 22, and Atl. Ich. Perc. t. xlii, fig. 4, and Revis. Prist. 1873, p. 313; Günther, Catal. i, p. 292; Day, Proc. Zool. Soc. 1870, p. 683.

B. vii, D. $\frac{12-13}{12-14}$, P. 16, V. 1/5, A. $\frac{3}{7-8}$, L. l. 45-47, L. tr. 6/12, Cæc. pyl. 5 (Kner).

Length of head 2/7, of caudal 1/6, height of body a little above 1/3 of the total length. *Eyes*—diameter $3\frac{1}{3}$ to $3\frac{2}{3}$ in length of head, 1 to $1\frac{1}{3}$ diameters from end of snout and also apart. A considerable rise from the snout to the base of the first dorsal. The maxilla hardly reaches to below the front edge of the orbit. Vertical limb of preopercle coarsely serrated, as is also its produced and rounded angle, where the serrations are wide apart, along the horizontal limb they are much blunter. Shoulder-bone serrated. *Teeth*—villiform, with the

* In the Zoological Record for 1867, p. 159, Dr. Günther observes: "*Pristipoma guoraka* (Cuv. and Val.) is described as *Pristipoma Neilli* (sp. n.) by Day." The type specimen is therefore figured, it is $6\frac{7}{10}$ inches in length.

outer row in the upper jaw somewhat enlarged. *Fins*—dorsal spines rather strong, the third and fourth the longest, and equal to half the height of the body below, but rather less in the young, interspinous membrane rather deeply notched, the last dorsal spine rather longer than the one preceding it. Pectoral equals the length of the head: second anal spine the longest,* and in the adult a fourth longer than the fifth of the dorsal, it is striated in grooves along its front edge: caudal cut square or slightly emarginate. *Colours*—silvery, darkest along the back, and in the young with an indistinct darkish band along the middle of the body: a dark spot, having steel blue reflections, exists on the opercle: snout dark: a dark streak along the dorsal fin most distinct in the immature. In a specimen $3\frac{1}{5}$ inches long the snout is dark, and there is a large black blotch covering 2/3 of the opercle.

Bleeker considers that *P. argyreum* is distinct from *P. guoraka*, the former being distinguished by a more obtuse and more convex profile, by the eyes being considerably larger, and by the second anal spine being weaker and shorter.

In examining a series of specimens of these fishes, it appears to me that one can hardly separate one species from the other, the difference being probably due to age and perhaps sex. In the young the eye is 1/3 the length of the head and only 1/2 a diameter from the end of the snout, and the second anal spine generally only equals the length of the postorbital portion of the head.

Habitat.—Seas of India to the Malay Archipelago, said to have been captured in fresh water. Russell observed that his fish was 2 feet in length, if it was this species, his specimen must have been a most extraordinarily large one.

9. Pristipoma operculare, Plate XX, fig. 2.

Playfair, Fish. Zanz. p. 24, pl. iv, f. 1.

B. vii, D. $\frac{11}{14}$, P. 19, V. 1/5, A. $\frac{3}{9}$, C. 17, L. l. 57, L. r. $\frac{65}{60}$, L. tr. 9/19, Cæc. pyl. 5.

Length of head 2/7, of caudal 2/11 to 1/6, height of body 2/7 of the total length. *Eyes*—diameter 1/5 to 2/11 of length of head, $1\frac{3}{4}$ diameters from end of snout, and $1\frac{1}{3}$ apart. Snout pointed and somewhat compressed: jaws of equal length. The maxilla reaches to below the posterior nostril. Preopercle emarginate, finely serrated, most coarsely so at its rounded angle. *Teeth*—in jaws villiform, the outer row being scarcely enlarged. *Fins*—dorsal spines strong, the fourth the highest, equal to the length of the postorbital portion of the head and higher than the rays. Pectoral as long as the head reaching to above the anal fin: the ventral does not reach to the anal: second anal spine the strongest and longest equal to the third of the dorsal: caudal emarginate. *Cæcal appendages*—very long. *Colours*—silvery, with a black blotch at the posterior-superior corner of the opercle: upper half of body with numerous black spots, which in some do, in others do not, form undulating bands: a black spot at the base of each dorsal spine and ray: dorsal and caudal dark edged: anal blackish in its front half.

The *young* are silvery, with the opercular spot distinct, a black mark in the axilla, and a few dark spots over the base of the pectoral fin: dark spots on the dorsal almost form bands along its upper and lower thirds: a dark band is likewise present along the centre of the soft portion: last half of caudal dark grey.

The form of this species is very similar to *P. nageb*, Rüppell, which, however, has D. $\frac{12}{14-15}$, L. l. 42-43, and the eye 1/6 of length of head. The second anal spine comparatively longer. In the specimen in Berlin, 16 inches long, the spots are sprinkled over one side of the body, but in bands as shown in Rüppell's figure on the other. A specimen of *P. suillum*, C.V. at Berlin from the Cape of Good Hope makes it doubtful whether *P. operculare* may not prove to be a variety of that species.

Habitat.—East coast of Africa to Sind, where it is common: attaining at least 15 inches in length.

Genus, 18—Hapalogenys, *Richards.*

Pogonias, sp. Tem. and Schleg.

Branchiostegals six or seven: pseudobranchiæ. Body rather elevated and compressed. Eyes of moderate size. Cleft of mouth horizontal: the anterior and under surfaces of the lower jaw and the lips covered with fine barbel-form papillæ. Preopercle serrated: opercle with short spines. Villiform teeth in the jaws, vomer, and palatines: an outer row of conical but somewhat obtuse teeth in either jaw, but no canines: tongue smooth. A deeply notched dorsal fin having eleven spines: anal with three: caudal convex or slightly notched. Scales ctenoid, of moderate or small size, and extended over the fins. Air-vessel simple. Pyloric appendages few.

Geographical distribution.—Seas of Sind to China and Japan.

The specimen captured off Sind differs from the usual definition of the Genus,† and I am indebted to the kind services of Professor Peters for suggesting its present position.

* In six specimens in my collection the following are the comparative lengths as regards the second anal spine:

1. Total length $3\frac{2}{10}$ inches: of body without caudal fin $2\frac{8}{10}$ inches: anal spine $\frac{5}{10}$ inches or $5\frac{3}{5}$ in length of body.
2. ,, ,, $3\frac{9}{10}$,, : ,, ,, ,, $3\frac{2}{10}$,, : ,, $\frac{6}{10}$,, ,, $5\frac{1}{3}$,, ,,
3. ,, ,, $4\frac{2}{10}$,, : ,, ,, ,, $3\frac{5}{10}$,, : ,, $\frac{7}{10}$,, ,, $5\frac{1}{7}$,, ,,
4. ,, ,, $4\frac{4}{10}$,, : ,, ,, ,, $3\frac{7}{10}$,, : ,, $\frac{7}{10}$,, ,, $5\frac{2}{7}$,, ,,
5. ,, ,, $4\frac{4}{10}$,, : ,, ,, ,, $3\frac{7}{10}$,, : ,, $\frac{7}{10}$,, ,, $5\frac{2}{7}$,, ,,
6. ,, ,, $5\frac{6}{10}$,, : ,, ,, ,, $4\frac{8}{10}$,, : ,, $\frac{9}{10}$,, ,, $5\frac{1}{3}$,, ,,

† The single species recorded here has seven (not six) branchiostegal rays: its spinous dorsal is very low, and divided by a notch from the soft portion of the fin, making one almost doubt the propriety of including it in this Genus. On the other hand the general form of the body, the dentition, &c. being the same, it is placed as an aberrant form of *Hapalogenys*.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Hapalogenys Petersi*, D. $\frac{11}{19}$, A. $\frac{3}{13}$, L. l. 100. Colours dark slatey, with the fins nearly black. Sind.

1. Hapalogenys Petersi, Plate XX, fig. 3.

B. vii, D. $\frac{11}{19}$, P. 19, V. 1/5, A. $\frac{3}{13}$, C. 17, L. l. ca. 100.

Length of head 2/7, of caudal nearly 1/6, height of body 4/13 of the total length. *Eyes*—diameter 2/7 of length of head, rather above 1 diameter from end of snout, and 3/4 of a diameter apart. Dorsal profile much more convex than that of the abdomen, a considerable rise from snout to the base of the dorsal fin, with a shallow concavity over the forehead. Lower jaw somewhat the longer, the maxilla reaches to below the hind third of the orbit. Vertical limb of preopercle somewhat emarginate and finely serrated in its whole extent, but the serrations are concealed by the scales: preorbital, sub- and inter-opercles entire. Two very obtuse spines on opercle. Lips thick, they, the chin, and under surface of lower jaw with innumerable closely-set fine papillæ, having barbel-like prolongations, but without any groove or deep pores. *Teeth*—villiform ones in jaws, vomer, and palate, the upper jaw with an outer row of from twenty to thirty conical ones, of no great size, and a similar row but of lesser number in the lower jaw. *Fins*—dorsal spines of moderate strength, very low in proportion to the rays, they increase in height to the third which equals three-fourths of the diameter of the eye in length, those posterior to it gradually decrease in length to the last but one, the last being higher and its length equal to three-fourths of that of the third spine: interspinous membrane deeply notched: soft portion of the fin highest anteriorly where the rays equal the length of the postorbital portion of the head, whereas the last only equals the height of the third dorsal spine: the pectoral equals the length of the head excluding the snout: the ventral reaches a little more than half way to the base of the anal: third anal spine much longer and stronger than the second, its length equal to the highest in the dorsal fin, soft portion of the fin similar to that of the soft dorsal: caudal emarginate. *Scales*—small, finely ctenoid, and covering all the fins. *Colours*—blackish-grey with the fins darker.

Habitat.—Sind and Meckran coast, being termed *Dah-ri*, at Gwadur. Although the species was not uncommon the specimens were so large, I was unable to bring away more than the skin of the smallest one, 18 inches in length, which was preserved in spirit, and from which the figure was taken.

Genus, 19—Diagramma, *Cuv.*

Plectorhynchus, pt. Lacép.

Branchiostegals six or seven: pseudobranchiæ. Body oblong, compressed, with the upper profile of the head parabolic. Eyes of moderate size. Mouth small, slightly protractile: lips thick and folded back. Preopercle serrated: sub-orbitals entire. Four or six open pores on the under surface of the lower jaw but no median groove. Teeth in jaws villiform, without canines: palate edentulous. One dorsal fin more or less receivable into a groove along its base, having from nine to fourteen spines: anal with three. Caudal not forked. Scales ctenoid, usually small, but of a moderate size in some species, present on the head excluding the lower jaw, and usually continued on to the soft dorsal and anal fins. Air-vessel simple, destitute of any constriction. Pyloric appendages few.

Geographical distribution.—From the Red Sea and East coast of Africa, through the seas of India to the Malay Archipelago and beyond. These fishes are much more abundant off Sind and as far as Bombay, than they are down the Malabar or Coromandel coasts of India. In fact Russell does not figure one of the genus.

Uses—generally not in much esteem as food, but some are good eating.

The species forming this genus are subject to considerable variations in the number of the dorsal rays, whilst a spine* more or less may exist. Irrespective of the differences observable in the dorsal fin, the colour varies almost as widely as amongst the *Serrani* (see page 9, ante). The ground colour is usually white or yellow in those which are striped longitudinally: there are, as a rule, component parts of two very distinct bands, the upper commencing above the eye by a wide base including the second dorsal spine and ending in a wedge-shaped form along the soft dorsal, both the roots of this band and its terminal extremities may be composed of several narrow ones which coalesce: next there is a central broad one going from the eye to the middle of the caudal fin, also terminating in a wedge-shaped form, this broad band may be made up of two parallel narrow ones, separated by an interspace: below this central band may be a lower or third one, either single or constituted of one or more narrow ones. If this is the correct solution of the composition of the ornamental colouring of these fishes, it seems by no means unlikely that some of those now recognised as species, will have to be considered as varieties. The form of the caudal fin often varies considerably in the same species, and this does not appear to be simply due to age.

SYNOPSIS OF SPECIES.

1. *Diagramma crassispinum*, D. $\frac{14}{15-16}$, A. $\frac{3}{7}$. Black, tail and edges of dorsal and anal fins white in the immature. Seas of India to the Malay Archipelago and beyond.

2. *Diagramma lineatum*, D. $\frac{12-13}{18-20}$, A. $\frac{3}{7}$. Yellowish-white with about six longitudinal chestnut bands, which may be reduced by amalgamation into three broad ones: anterior dorsal spines not much higher than the others. Red Sea, seas of India to the Malay Archipelago and beyond.

* Regarding the dorsal spines "in fact the height of these spines appear to vary very much, and I fully believe that *D. balteatum* is a variety of *D. pictum*."—Günther, Catal. i, p. 328. If therefore the number of spines and rays likewise vary, and the colours are subject to considerable modifications, great caution becomes necessary to prevent falling into the error of considering a variety as a distinct species.

3. *Diagramma Orientale*, D. $\frac{13}{17 \mid 18}$, A. $\frac{3}{7}$. Yellowish-white, with four or five complete or interrupted chestnut bands. Red Sea, seas of India to the Malay Archipelago and beyond.

4. *Diagramma cinctum*, D. $\frac{12}{16 \mid 17}$, A. $\frac{3}{7}$. Slatey-grey, covered with large black blotches which also exist on the fins. Sind, China, and Japan.

5. *Diagramma griseum*, D. $\frac{11-12}{18-21}$, A. $\frac{3}{7-9}$. Grey: fins blackish. East coast of Africa, seas of India.

6. *Diagramma pictum*, D. $\frac{9-10}{22-23}$, A. $\frac{3}{7}$. Front portion of spinous dorsal elevated. Caudal rounded. Longitudinally banded. Red Sea, East coast of Africa, seas of India to the Malay Archipelago and beyond.

7. *Diagramma punctatum*, D. $\frac{9-10}{22-25}$, A. $\frac{3}{7}$. Front portion of spinous dorsal not elevated: caudal notched, spotted and blotched with yellow. Red Sea, seas of India to the Malay Archipelago.

8. *Diagramma picoides*, D. $\frac{12}{19}$, A. $\frac{3}{7}$. Four large light blotches. Indian seas.

1. Diagramma crassispinum, Plate XX, fig. 4.

Diagramma crassispinum, Rüppell, N. W. Fische, p. 125, t. 30, f. 4; Bleeker, Sciæn. p. 26; Günther, Catal. i, p. 319; Klunz. Verh. z. b. Ges. Wien, 1870, p. 738.

Pristipoma nigrum, Cantor, Catal. p. 74; ? Cuv. and Val. v, p. 258; Günther, Catal. i, p. 289.

Diagramma affine, Günther, Catal. i, p. 319;* Playfair, Fishes of Zanzibar, p. 26.

Diagramma nigrum, Day, Malabar Fishes, p. 23.

Diagramma altum, Day, Proc. Zool. Soc. 1869, p. 514 *(young)*.

Plectorhynchus crassispina, Bleeker, Ternate, p. 232 and Rev. Plec. 1873, p. 277.

B. vii, D. $\frac{14}{15-16}$, P. 17, V. 1/5, A. $\frac{3}{7}$, C. 17, L. l. 50-60, L. r. $\frac{60-68}{50-55}$, L. tr. 10/17, Cæc. pyl. 6.

Length of head 2/7, of caudal 1/6, height of body in the adult 1/3 of the total length. *Eyes*—diameter in the adult 2/9 of length of head, $1\frac{1}{2}$ diameters from end of snout, and more than one apart. The maxilla does not reach so far in the adult as to below the front edge of the orbit. Open pores but no groove below the mandible. Vertical limb of preopercle finely serrated in the adult, more coarsely so in the young, and its angle rounded, posterior half of its horizontal limb serrated. *Teeth*—villiform in the jaws. *Fins*—dorsal spines strong, the alternate ones thicker on one side, the fourth the highest, nearly equalling the length of the head without the snout: pectoral rather longer than the highest dorsal spine, it reaches to rather beyond the ventral, which latter extends three-fourths of the way to the anus. Second anal spine much stronger than the third, it equals the highest of the dorsal fin. Free portion of tail rather longer than high at its commencement. *Colours*—greyish, or slatey-grey, with a violet tinge over the head, and a brassy one on the body: fins nearly black. A few irregular coppery spots on the body, and a tinge of the same colour over the spinous dorsal: the other fins of a violet slate-colour, lightest along their centres. In the *young* the caudal is yellowish-white, and in one specimen having a dark caudal, which I kept a few years in spirit I now find the fin nearly white, the colouring matter having disappeared.

This fish appears to alter considerably with age. The height of the body is at first equal to nearly half of the total length. In some the maxilla extends to below the first third of the orbit, in others to beneath the posterior nostril; whilst the size of the eye varies in individual specimens.

The specimen marked *Diagramma crassispinum* in the British Museum, received from Zanzibar, is a skin under 10 inches in length, and not in a good state; the spines are a little shorter than in a Malabar specimen of the same size, irrespective of which it has several narrow black bands passing backwards and downwards from the base of the dorsal fin over the body.

Jerdon, M. J. L. and S. 1851, observes of *Scolopsides*: "a fourth species is also found, of which, however, I only saw one specimen. Its colours were inky black, with the edges of the soft dorsal white, and the caudal pale yellowish-white. It was called *Tawooloo pinnel*." The figure is amongst Sir W. Elliot's collection named as above by Jerdon, and is this species.

Habitat.—Red Sea, seas of India to the Malay Archipelago and beyond. It attains two feet or more in length and is good eating.

2. Diagramma lineatum, Plate XX, fig. 5.

Sciæna lineata, Linn. Mus. Ad. Frid. t. xxxi, f. 4.

Perca diagramma et *lineata*, Gmel. Linn. p. 1319.

Grammistes lineatus, Bl. Schn. p. 186.

Diagramma lineatum, Cuv. and Val. v, p. 309: Bleeker, Amboina, iv, p. 112; Günther, Catal. i, p. 330; Klunz. Verh. z. b. Ges. Wien, 1870, p. 735.

Diagramma Lessonii, Cuv. and Val. v, p. 313; Less. Voy. Coq. Zool. ii, p. 119, pl. 24; Bleeker, Bat. p. 463: Günther, Catal. i, p. 329, and Fische d. Sudsee, p. 28, t. xxiii.

Diagramma albovittatum, Rüpp. N. W. Fische, p. 125, t. xxxi, fig. 2; Bleeker, Makass. p. 46; Günther, Catal. i, p. 330; Klunz. l. c. p. 736.

Plectorhynchus lineatus, Bleeker, Atl. Ich. Perc. t. xxviii, f. 4, Ternate, p. 232 and Revis. Plector. p. 286.

Plectorhynchus Lessoni, Bleeker, Atl. Ich. Perc. t. xxxix, fig. 3 and Revis. Plector. p. 288.

Plectorhynchus albovittatus, Bleeker, Revis. Plector. p. 280.

* References to the plates and figures cited in the British Museum Catalogue are omitted as misleading, for such have not been published, and the figures do not now exist.

B. vi, D. $\frac{12-13}{18-20}$, P. 19, V. 1/5, A. $\frac{3}{7}$, C. 17, L. l. 59, L. r. $\frac{86}{66}$, L. tr. 13/24.

Length of head about 1/4, of caudal 1/6, height of body from 4/13 to 2/7 of the total length. *Eyes*—diameter from 1/3 to 2/7 of length of head, 1 diameter from end of snout, and nearly 1 apart. Dorsal profile much more convex than that of the abdomen, profile of head parabolic. The maxilla reaches to below the front third of the orbit. The depth of the preorbital nearly equals the diameter of the eye. Vertical limb of preopercle very slightly emarginate, its angle rounded, and the whole finely and evenly serrated. *Teeth*—fine. *Fins*—dorsal spines strong, every alternate one broadest on one side, they increase in height to the fourth, which equals two-fifths or one-third of that of the body, the last being about one-fifth shorter, soft portion of the fin gradually increasing in height, its middle third being higher than the spinous. Pectoral as long as the head without the snout: ventral reaching three-fourths of the distance to the anal, the second spine of which latter fin is stronger and slightly longer than the third, equalling the length of the head behind the middle of the orbit: caudal rounded, or cut rather square. *Colours*—*D. lineatum*, yellowish-white superiorly, becoming white along the sides and on the abdomen: about six chestnut-coloured bands, the upper being wider than the ground colour, extend from the head along the body, the two first below the soft dorsal fin, coalescing and being continued along its centre as far as its termination in a wedge-shaped form: the third passes through the upper third of the eye along the side to a little above the centre of the caudal fin, and in its course touches the lower edge of the soft dorsal: the fourth arises by one or two roots below the eye, and goes to the lower third of the caudal, and joining with the last band, is continued in a pointed manner to its termination: the fifth proceeds from the angle of the mouth to the lower edge of the base of the caudal, and the sixth from below it to the lower edge of the soft portion of the anal: fins yellow, with sometimes one or more dark blotches: dorsal with a dark edge, which may be confined to its soft portion: three oblique bands across either caudal lobe, which are occasionally broken up into blotches: a band along the middle of the anal fin.

Variety.—*Diagramma albovittatum*, silvery-white above, becoming yellowish-white below, a dark chestnut median band commences on the occiput opposite the middle of the eye, and goes to the anterior dorsal spine, being continued first along the bases of the spines, but attaining their middle posteriorly, it joins the second band: the second chestnut band commences on the snout and passes above the eye, and gradually increasing in width posteriorly, arrives at the base of the soft dorsal, and is continued along its middle as far as its termination in a wedge-shaped form: the third band, which may be considered the coalescence of the two in *D. lineatum*, extends from the snout through the eye, becomes the widest, and arriving at the centre of the base of the tail, diminishes in width, and is continued in a wedge-shape to the termination of the fin. Fins yellow, a narrow dark edge to the spinous dorsal, which increases in width over the soft portion: two oblique dark bands across the upper caudal lobe and one along the lower: a darkish edge to ventrals, and the outer half of anal with a dark band.

In some specimens a wide chestnut coloured band appears to extend from below the eye, covering the abdomen, and leaving only a very narrow interspace of whitish ground colour between it and the band immediately above it; in such specimens the colour of the body appears to be chestnut, with three narrow white or light longitudinal bands. It must, however, be evident that other points being identical, this form is merely the *D. lineatum** with three instead of six longitudinal body bands, which, due to their decrease in number, show an increase in width.

Bleeker (Revis. Plector. p. 282) observes that *albovittatum* has no dark border to the spinous dorsal, nor spots on the paired fins, whilst the dorsal spines are of about equal length. A frontal profile little or not at all convex, L. r. $\frac{85}{65}$. The specimen I have figured has L. r. $\frac{86}{66}$, and appears to so connect the two species that it is difficult to say to which it belongs, the colours and form of the spinous dorsal being such as refers it more to *lineatum* than *albovittatum*, but the number of scales, absence of spots on the paired fins, and a black edge to the spinous dorsal, being such as have been pointed out as characteristic of *albovittatum*.

In the Catalogue of Fishes of the British Museum, i, p. 330, *Bodian Cuvier*, Bennett Fish. Ceylon, p. 13, fig. 13 is referred to *Diagramma lineatum*.† In the "Fishes of Zanzibar," p. 28, under the head of *Diagramma Cuvieri*, is Seba, iii, 27, 19, *Bodian Cuvier*, Bennett, and *Diagramma Seba*, Bleeker, whilst *D. Lessonii* (*l. c.*) is recorded as a distinct species. In the "Fische d. Sudsee," p. 28, the synonyms for *D. Lessonii* are *D. seba*, Bleeker, but Bennett's fish is not referred to. Bleeker in his revision of these fishes (pp. 288-9) observes that *Lessonii* is very near *lineatus*, and may represent its adult age, the formula of the scales and rays being identical.

Turning to Bleeker's figure of *D. Sebæ*, = *D. Lessonii*, Günther, the anterior dorsal spines in the former appear to be more elevated. If the two longitudinal bands from the eye in the figure referred to were amalgamated, and the fin marks reduced to blotches or spots so frequently the case in large specimens,

* Klunzinger (Verh. z. b. Ges. Wien. 1870, p. 736) observes that *D. Blochii* differs from *D. albovittatum* in having 10 dorsal spines, &c., and places *D. lineatum* (l. c. p. 735) as a variety of *D. punctatum*.

† It is also a subject worthy of consideration whether *Plectorhynchus polytænia* = *P. polytænioides*, Bleeker, L. r. $\frac{100}{85}$, is not identical with *P. Goldmani*, = *P. hæmatochir*, L. l. $\frac{100}{65}$, the former having a bluish instead of a yellowish-white ground colour, and the bands being light brown instead of dark chestnut, whilst the deficiency of colouring matter accounts for the absence of spots on the fins of the former but present in the latter. The colouring of *P. Goldmani* again approaches very nearly that of *P.* or *Diagramma Seba*, Bleeker, L. l. $\frac{100}{80}$, which, as observed, is considered by Dr. Günther as identical with *D. Lessonii*, which is a variety of *D. lineatum*.

the colours would considerably resemble those of *lineatum*; the three upper bands would only have to be conjoined and continued on to the dorsal fin, when *albovittatum* would be reproduced. But Bleeker observes that the scales are L. r. $\frac{100}{80}$, and more than are found in *lineatum* or *Lessonii*: were it not for that fact, one would almost feel inclined to agree with Dr. Günther, and place it as another synonym of *lineatum*.

It is very desirable that some one residing where these fishes are to be obtained in quantities, as Sind or the Andamans, would bring together a large number, of all sizes, at different seasons of the year, carefully examine the sexes, and the number of their cæcal appendages whilst they are in a fresh state, making a comparison between all the differently coloured ones, the result I anticipate would be, as in the *Serrani*, that a conclusion must be arrived at, that there are many varieties but comparatively few species.

Habitat.—Red Sea, seas of India to the Malay Archipelago and beyond. The specimen figured was given me by Dr. Shortt, Inspector General of Vaccination for the Madras Presidency, who received it whilst fresh at Cuddalore in 1867. Personally I never obtained a specimen of this genus along the Coromandel coast.

3. Diagramma Orientale, Plate XX, fig. 6.

Anthias Orientalis, Bloch. t. 326, fig. 3; Bl. Schn. p. 306.

Lutjanus aurantius, Lacép. iv, p. 239.

Serranus Orientalis, Cuv. and Val. ii, p. 318.

Diagramma pica, Cuv. and Val. v, p. 297; Günther, Catal. i, p. 326, and Fische d. Sudsee, p. 27, t. xxii, fig. A.

Diagramma Orientale, Cuv. and Val. v, p. 299, pl. 124; Bleeker, Verh. Bat. Gen. xxiii, Sciæn. p. 23; Günther, Catal. i, p. 326 and Fische d. Sudsee, p. 28, taf. xxii, fig. B and C.

Diagramma Sibbaldii, Bennett, Proc. Zool. Soc. 1832, p. 182.

Plectorhynchus Orientalis, Swains. Fish. ii, p. 218; Bleeker, Atl. Ich. Perc. t. xxviii, fig. 3, and Revis. Plectorh. p. 295.

B. vi, D. $\frac{13}{17-18}$, P. 17, V. 1/5, A. $\frac{3}{7}$, C. 17, L. r. $\frac{100}{85}$, L. tr. 13/25.

Length of head from 3/13 to 2/9, of caudal 1/6 to 1/7, height of body 2/7 of the total length. *Eyes*—diameter from 1/3 to 2/7 of length of head, 1 diameter from the end of snout. Dorsal profile much more convex than the abdominal: profile of head parabolic. The maxilla reaches to below the front third of the orbit: the depth of the preorbital nearly equals the diameter of the eye. Vertical limb of preopercle serrated, its angle not produced. *Teeth*—generic. *Fins*—dorsal spines of moderate strength, every alternate one strongest on one side, the second nearly as high as the third which is the longest in the fin and equals from half to two-fifths of the height of the body, the last being from one-third to one-half shorter: soft portion of the fin gradually increasing in height, its middle third being higher than the spinous. Pectoral as long as the head without the snout: ventral reaching three-fourths of the distance to the anal, the second spine of which latter fin is stronger and longer than the third, equalling the length of the head posterior to the middle of the eye: caudal rounded or cut rather square. *Colours*—yellowish superiorly, becoming white on the sides and beneath, the body with several chestnut bands nearly or quite as wide as the ground-colour. There may be four or five complete or interrupted horizontal bands along the snout and head, which form three or four on the body: the highest going to the base of the spinous dorsal: the second, usually interrupted, to the first two-thirds of the base of the soft dorsal: the third bifurcating beyond the end of the pectoral fin divides into two, the superior, often interrupted, going to the upper portion of the caudal fin, and the inferior to its lower portion, on the caudal these two bands gradually approximate or even coalesce, and are so continued to the centre of the fins termination: the lowest body band goes from below the pectoral fin to the end of the base of the anal. Spinous dorsal with a narrow dark upper edge: a dark angular band along its base, which is anteriorly two-thirds as high as the spines, but ending in a point at the base of the last spine: a similar wedge-shaped band exists on the soft dorsal, its base being along the origin of the first ten or twelve rays and its apex at the upper termination of the same rays. Pectoral yellowish, with a dark blotch covering all but its margin: a black band along the middle of the anal and an oblique one across either lobe of the caudal, the lower being sometimes divided into two, or having a light spot in its centre.

The *Orientale* figured in Bloch, Cuv. and Val., and in Garrett's Fische d. Sudsee shows much of the colouring of *D. pica*:—a band passes vertically from the upper surface of the head behind the eye to the angle of the mouth, and from it proceeds a wide single horizontal one along the body which is more or less interrupted but eventually constitutes a central caudal band: from this lateral band one may proceed directly upwards and form the basal blotch on the spinous dorsal, or it may be interrupted in this course; a second band proceeds upwards and forms the blotch on the soft dorsal: a lower band likewise proceeds from the base of the pectoral to the end of the anal joining the band on that fin: the marks on the fins are as in the first variety.

That this species is very closely related to *D. lineatum* is apparent: its colouring is evidently a modification of identical bands somewhat differently disposed. The dorsal spines however differ, and to judge by this question solely would cause Bennett's figure of *Bodian Cuvier*, p. 13, fig. 13, to be a *Diagramma* with much the form of *Orientale* and the colouring of *D. lineatum*. Cantor indeed observes of it, "in the absence of a detailed description * * the species cannot be determined."

Habitat.—Red Sea, seas of India, to the Malay Archipelago, and beyond.

4. Diagramma cinctum, Plate XXI, fig. 1.

Diagramma cinctum, Temm. and Schleg. Fauna Japonica, Poiss. p. 61, pl. 26, f. 1; Richardson, Ich. China, p. 226; Günther, Catal. i, p. 325.

B. vii, D. $\frac{12}{16-17}$, P. 17, V. 1/5, A. $\frac{3}{7}$, C. 17, L. l. 56, L. r. $\frac{64-68}{44-48}$, L. tr. 14/20.

Length of head 3/11, of caudal 1/6, height of body 1/3 of the total length. *Eyes*—diameter $4\frac{1}{4}$ in length of head, $1\frac{1}{4}$ diameters from end of snout, and 1 apart. A considerable rise from the snout to the base of the dorsal fin: upper jaw slightly the longer. The maxilla reaches to below the front edge of the orbit. Vertical margin of preopercle also shoulder-bone serrated. *Teeth*—villiform in the jaws. *Fins*—dorsal spines strong, increasing in length to the fourth and fifth, which are equal in height to nearly half that of the body, from the fifth they decrease in length: soft portions of dorsal and anal rounded. Pectoral half as long as the body is high, it does not reach so far as the ventral, which last extends three-fourths of the way to the anal: second anal spine much stronger and longer than the third, it equals nearly 1/3 the height of the body and the length of the postorbital portion of the head: caudal cut square. *Colours*—slaty-grey, the upper half of the anterior and the whole of the posterior portion of the body covered with large black blotches. Two rows of black blotches and an outer black margin to the dorsal fin, usually an additional row on the soft portion: caudal and soft portion of the anal likewise with black blotches and a black margin: ventral nearly black: pectoral yellow. The bands on the body alluded to in the 'Fauna Japonica' and shown in the plate do not exist in my Indian specimens.

Habitat.—Sind, where it is not uncommon, attaining to two feet in length: also in China and Japan. In the British Museum is a specimen marked "*g.* adult: skin. Nepal? Presented by B. H. Hodgson, Esq." (Catal. vol. i, p. 326.); this marine fish, it is almost unnecessary to observe, could not have been captured in such a locality, but was probably obtained from the mouth of the Hooghly along with several other sea fish, which are likewise recorded as from Nepal and sent by Mr. Hodgson.

5. Diagramma griseum, Plate XXI, fig. 2.

Cuv. and Val. v, p. 306; Günther, Catal. i, p. 321; Playfair, Fishes of Zanzibar, p. 26, pl. iv, fig. 3, var. *b.* and Proc. Zool. Soc. 1867, p. 851.*

B. vii, D. $\frac{11-12}{15-21}$, P. 17, V. 1/5, A. $\frac{3}{7-9}$, C. 17, L. l. 63, L. r. $\frac{92-95}{68-75}$, L. tr. 13/26, Cæc. pyl. 9.

Length of head 3/11 to 1/4, of caudal 1/6, height of body 1/3 of the total length. *Eyes*—diameter from 2/7 in the young to 1/4 of length of head, $1\frac{1}{2}$ diameters from end of snout, and 1 apart. The profile from the snout to occiput more obtuse in adults than in the young. The maxilla reaches to below the posterior nostril. Vertical limb of preopercle rather strongly and evenly serrated, angle rounded and also serrated. Shoulder-bone serrated. *Teeth*—villiform in the jaws. *Fins*—dorsal spines of moderate strength, the third or fourth the highest and equal to the length of the postorbital portion of the head, from thence they gradually decrease to the last; height of soft dorsal scarcely exceeds that of one-third of the body. Pectoral as long as head without the snout and of about equal length to the ventral: second anal spine strongest and longest, equalling the distance between the middle of the orbit and the end of the head in the young or merely the postorbital portion in the adult: caudal slightly emarginate. Free portion of tail as deep at its commencement as it is long. *Scales*—in oblique rows above the lateral-line, some are present on the preorbital. *Colours*—uniform grey or olive-grey with the fins nearly or quite black. In the *young* the general colour is olive, with some sinuous and narrow light blue lines over the snout and cheeks, but which usually fade shortly after death. There are also several sinuous blue lines taking an oblique direction from the head upwards, and which extend to nearly the length of the body. Also a black mark over the posterior end of the free portion of the tail.

Variety.—"Colour grey above, white below, with four whitish curved cross bands; the first crosses the forehead and terminates at the angles of the operculum and preoperculum: the second proceeds from the second dorsal spine, in the direction of the root of the ventrals: the third runs parallel to the last from the seventh and eighth dorsal spines; and the last, also parallel, runs from the first anal ray to the posterior of anal. Fins blackish, immaculate. Length $4\frac{1}{2}$ to 17 inches." ("Fishes of Zanzibar," p. 26.)

Diagramma sordidum, Klunz. (Verh. z. b. Ges. Wien, 1870, p. 67) = ? *Sciæna schotaf*, Forsk. (p. 51) has the sixth dorsal spine the highest and slightly longer than in *D. griseum*, D. $\frac{12}{18}$, A. $\frac{3}{9}$. The above is from one of the type specimens which closely resembles *D. griseum.*

Habitat.—East coast of Africa, Beloochistan and seas of India, attaining at least 18 inches in length. It is very common in Sind and Bombay. Specimen figured 6 inches long.

6. Diagramma pictum, Plate XXI, fig. 3.

Perca picta, Thunb. Nya Handl. xiii, 1792, p. 142, pl. v, fig. 1.
Sciæna abu mgaterin, Forsk. p. 51.

* Col. Playfair observes that "several specimens of this fish were caught in a mountain-torrent in Seychelles, which loses itself in a sand-bank without reaching the sea. The only direct communication between the two is after unusually heavy floods, so that it would appear that this salt water species not only visits, but habitually lives in fresh water." This conclusion requires modification, the species perhaps, as is common with many other marine forms in the East, entered the river with the rain floods, and owing to a sudden subsidence, return to the ocean became cut off, and those which did not die were waiting for the next rains to allow them to escape to the sea (see page 68 ante).

Anthias diagramma, Bloch, t. 320 (var. *Blochii*).
Grammistes pictus, Bl. Sch. pp. 184, 190.
Holocentrus radjabau, Lacép. iv, pp. 335, 374.
Lutjanus pictus, Lacép. v, pp. 687, 688.
Diagramma Blochii, Cuv. and Val. v, p. 312; Günther, Catal. i, p. 329.
? *Diagramma pœcilopterum*, Cuv. and Val. v, p. 314; Temm. and Schleg. Fauna Japon. Poiss. p. 61; Günther, Catal. i, p. 329.
Diagramma pictum, Cuv. and Val. v, p. 315; Tem. and Schleg. Fauna Japon. p. 62; Richardson, Ich. China, p. 227; Günther, Catal. i, p. 327.
Diagramma balteatum, (Kuhl. and v. Hass.) Cuv. and Val. v, p. 316.
Plectorhynchus Blochii, Cantor, Catal. p. 77.
Plectorhynchus balteatus, Cantor, Catal. p. 78.
Plectorhynchus punctatus, Bleeker, Atl. Ich. Perc. xxii, fig. 1, Ceram, p. 187, and Revis. Plector. p. 298.

B. vi, D. $\frac{9-10}{22-23}$, P. 17, V. I/5, A. $\frac{3}{7}$, L. r. $\frac{120}{100}$, L. tr. 15/26.

Length of head 2/9, of caudal 2/13, height of body 4/15 of the total length. *Eyes*—diameter 2/7 (in the young) to 2/9 of the length of head, $1\frac{1}{4}$ to 2 diameters from the end of snout, and nearly 1 apart. The maxilla reaches to below the front edge of the orbit. *Teeth*—generic. *Fins*—dorsal spines of moderate strength, the first short, the third usually the highest and equalling about one half the depth of the body, the second and fourth spines are of nearly the same height but variations are constantly found, the last dorsal spine is about one fourth of the height of the body, and the rays a little higher than the anterior or most elevated portion of the spines. Pectoral as long as the head excluding the snout: the second and third anal spines of about the same length and equal to about half the length of the head or the height of the sixth dorsal spine: caudal cut nearly square, or with rounded angles. *Colours*—This fish having been divided into several species due to variations in colour, I propose describing such in accordance with what appears to me to be that most readily explained. *Diagramma Blochii* (variety) orange yellow or white, with chestnut brown or black longitudinal bands, the upper three of which commence between the eye and the base of the first dorsal spine, the superior narrow runs along the base of the spinous dorsal and joins the one on the dorsal fin: the second and third are broader and coalesce above the middle of the pectoral fin, becoming lost below the base of the soft dorsal and on the upper edge of the free portion of the tail: the fourth and fifth proceed from the snout, through the eye, and go direct to the centre of the base of the caudal, where they join and are continued to the end of the fin in a wedge-shaped form: below these bands are one or two more, the upper of which goes to the lower edge of the free portion of the tail. Dorsal fin with a narrow black margin, a broad dark band runs from the upper two-thirds of its second spine backwards and downwards to the base of the fin, leaving the lower third of the second and third spines uncovered, this band is sometimes interrupted (as shown by Bloch), causing a black spot to exist between its third and fourth spines; if continuous (as in Pl. xxi, fig. 3), it coalesces with the upper body band, and is continued in a wedge-shaped form to the posterior-superior angle of the soft dorsal fin. Caudal with a central wedge-shaped dark band, and a cross-band over its upper and lower angles, these are frequently broken up into spots: the lower half of the anal and the end of the ventral black.*

A very interesting form of colouring exists in a specimen with D. $\frac{9}{23}$ from Madras, presented by Dr. Jerdon to the British Museum, it is the intermediate form of ornamental colouring between *D. Blochii* and *D. pictum*, the two bands which pass backwards from the eye to the caudal fin become merged into one below the middle of the soft dorsal.

Diagramma pictum has the same ground colour as *D. Blochii* with fewer but wider longitudinal bands: the first, second, and third bands coalesce much sooner, the upper two below the middle or end of the spinous dorsal, and the second and third on the nape: whilst the two bands which pass backwards from the eye to the caudal fin, and which coalesce in Dr. Jerdon's specimen below the middle of the soft dorsal, in the typical *pictum* form a single broad one by the amalgamation of them in their whole length from the eye to the tail. The fins are coloured as described for *D. Blochii*, in short the immature appear to be generally coloured as in the typical *D. pictum*.

Bleeker's figure of *Plectorhynchus punctatus* is this species, the ornamental colouring being increased by the addition of some extra intermediate bands which are broken up into spots: the ventral and anal are likewise darker, due to the existence of additional colour.

In a bad skin in the British Museum, marked *D. Blochii* with D. $\frac{10}{21}$, all the longitudinal bands are broken up into a series of elongated spots or blotches.

Having remarked how the wide bands in the typical *D. pictum* are liable to be varied by the existence of more numerous but narrower ones in *D. Blochii* it remains to be observed that they may be further modified by being broken up into rows of oblong blotches or spots; or when narrow bands exist they may be alternately complete or interrupted as in *D. pœcilopterum*.

* Col. Playfair, Fish. Zanz. p. 28, apparently on the authority of a single skin, asserts "the colour of the adult is dark grey, with darker longitudinal lines and series of spots; fins blackish, except pectorals, which are grey." But as specimens with the colouring of the typical *Blochii* exist as large as the grey lineated one, I think it would be preferable to consider such as having a peculiar form of colouring. However, a doubt is raised as to whether *Diagramma Blochii*, Cuv. and Val., is *Anthias diagramma*, Bloch, as he remarks "the younger specimen agrees perfectly with the *Anthias diagramma* of Bloch, although it is doubtful whether it is the same as the *D. Blochii* of Cuvier and Valenciennes, which is only known from a figure taken at Trincomalee."

Habitat.—Red Sea, East coast of Africa, seas of India to the Malay Archipelago and beyond. The specimen is figured life-size.

7. Diagramma punctatum, Plate XXI, fig. 4.

(Ehren.) Cuv. and Val. v, p. 302; Temm. and Schleg. Fauna Japon. p. 60, pl. xxvi, A; Rüpp. Atl. Fische, p. 126, t. 32, f. 2, and N. W. Fische, p. 125; Quoy and Gaim. Voy. Astrol. Poiss. p. 699, pl. xii, fig. 2; Günther, Catal. i, p. 323; Kner, Novara, Fische, p. 54; Klunzing. Verh. z. b. Ges. Wien, 1870, p. 734 (part).

Diagramma cinerascens, Cuv. and Val. v, p. 307; Rupp. Atl. p. 127.

? Diagramma centurio, Cuv. and Val. v, p. 308; Playfair, Fish. Zanz. p. 27.

Plectorhynchus punctatus, Bleeker, Ceram. p. 187 and Atl. Ich. Perc. t. xxii, f. 1.

B. vii, D. $\frac{9-10}{22-25}$, P. 17, V. 1/5, A. $\frac{3}{7}$, C. 17, L. r. $\frac{105-109}{90-95}$, L. tr. 15/20.

Length of head from 4/17 to 2/9, of caudal from 1/8 to 1/9, height of body 2/7 of the total length. *Eyes*—diameter from 2/9 to 1/4 of length of head, $1\frac{1}{2}$ to 2 diameters from end of snout, and about 1 apart. Dorsal profile much more convex than that of the abdomen. The maxilla reaches to below the hind nostril. Vertical border of preopercle serrated, as is also its rounded angle. Shoulder-bone serrated. *Teeth*—villiform. *Fins*—dorsal spines moderately strong, the second and third being the longest and equal to two-fifths of the length of the head: second anal spine slightly the strongest but the third a little the longest: caudal lunated: the distance the ventral fins extend varies considerably with the age of the fish, becoming comparatively very much shorter in the larger specimens. *Colours*—greyish, several rows of large brilliant golden spots along the upper half of the body: three short bluish bands pass from the eye across the opercle, and two more in the same direction between the eye and the angle of the mouth, these bands are continued on to the body between the rows of spots. Two rows of brownish spots dashed with yellow exist on the hard dorsal as well as a light longitudinal band: soft dorsal with similar spots much wider than the ground colour: caudal the same: anal and ventral likewise spotted, the latter being greyish externally: pectoral golden.

In a specimen $27\frac{1}{2}$ inches in length the colouring varied, it being of an uniform greyish-brown, some small ill-defined spots on the soft dorsal: the caudal covered with small circular brown marks as well as the outer half of the anal: ventral externally greyish.

Bleeker (Revis. Plector. p. 301) considers *D. pictum* and *D. punctatum* as the young and adult of one species, the colours and the form of the dorsal changing with age. My specimens however show *D. pictum* (figured life-size) with L. r. $\frac{120}{100}$, and *D. punctatum* (at 10 inches in length, Pl. xxi, fig. 4), with L. r. $\frac{109}{95}$, and a specimen $27\frac{1}{2}$ inches with L. r. $\frac{105}{90}$. But Dr. Bleeker having, as he observes, 43 specimens which show the gradations, make one very doubtful whether this species may not be the adult of *pictum*.

Habitat.—Red Sea, seas of India to the Malay Archipelago.

8. Diagramma picoides.

Peters, Monatsb. Akad. Wiss. Berl. 1866, p. 94.

B. vii, D. $\frac{12}{19}$, P. 17, V. 1/5, A. $\frac{3}{7}$, C. 17, L. l. 100, L. r. $\frac{115}{110}$, L. tr. 16-17/31-32.

Length of head 2/9, of caudal nearly 1/7, height of body 4/17 of the total length. *Eyes*—diameter 2/9 of length of head, $1\frac{2}{3}$ diameters from end of snout, and $1\frac{1}{3}$ apart. *Fins*—the spines of the dorsal are of moderate height, the third being a little more than 1/3 of the height of the body: ventral spine longer than the third of the dorsal fin: the second anal spine is slightly longer and much stronger than the third, and one-third longer than the highest in the dorsal fin. *Colours*—upper 1/2 of body black with four large light blotches, one being over the snout: a second across the nape: a third under the commencement of the dorsal rays, and the last over the free portion of the tail. The white colour of the abdomen is divided in a zig-zag or wavy line from the black of the back. On the tail where there is a row of black spots, the white colour merges into the upper spot. Dorsal fin with a black base and upper edge, and having a white median longitudinal band. The anal and caudal with irregular black spots.

Habitat.—A dried example nearly 12 inches long was obtained by Lamare Pigout, most probably in the East Indies, but it might have come from the Mauritius, or even the Cape of Good Hope.

Genus, 20—Lobotes, *Cuv.*

Branchiostegals six: pseudobranchiæ. Body and fins somewhat elevated: upper profile of head concave. Eyes rather small. Mouth moderately protractile, its cleft oblique, lower jaw the longer. Opercle with obtuse points: preopercle serrated. Villiform teeth in the jaws having an external enlarged and somewhat conical row, but without canines: palate edentulous. One dorsal fin with twelve stout spines: anal with three: caudal rounded. Scales ctenoid, of moderate size, extended over the head. Air-vessel simple, without any constriction.

Geographical distribution.—Seas of India, China, and Atlantic coasts of America.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Lobotes Surinamensis*, Bloch, D. $\frac{12}{15-16}$, A. $\frac{3}{11-13}$, L. l. 48. Brassy-brown blotched with darker. East coast of Africa, seas of India to the Malay Archipelago and beyond.

Lobotes Surinamensis, Plate XXI, fig. 5.

Holocentrus Surinamensis, Bloch, t. 243; Bl. Schn. p. 316.

Lobotes Surinamensis, Cuv. and Val. v, 319; Day, Fishes of Malabar, p. 24.

Lobotes erate, Cuv. and Val. v, p. 322; Bleeker, Sciæn. p. 26, and Atl. Ich. Perc. t. xxiii, fig. 4; Cantor, Catal. p. 80.

Lobotes Farkharii et *somnolentus*, Cuv. and Val. v, p. 324.

Lobotes auctorum, Günther, Catal. i, p. 338.

Parrandee, Mal.: *Musalli*, Tam.: *Chota bekkut*, Ooriah.

B. vi, D. $\frac{12}{15-16}$, P. 15-17, V. 1/5, A. $\frac{3}{11-13}$, C. 17, L. r. $\frac{46-48}{43-45}$, L. tr. 9-11/22, Cæc. pyl. 4 (3), Vert. 13/11.

Length of head from $3\frac{1}{2}$ to $3\frac{2}{3}$, of caudal 1/6, height of body $2\frac{1}{2}$ to 1/3 in the total length. *Eyes*—diameter 1/6 to 1/7 of the length of head, 1 diameter from the end of snout, and $1\frac{1}{2}$ to 2 apart. A concavity in the dorsal profile over the eyes. The maxilla reaches to below the anterior third of the orbit. Vertical limb of preopercle denticulated, with spinate teeth at its rounded and slightly produced angle: horizontal limb entire. Shoulder-bone and one in axilla denticulated. *Teeth*—fine. *Fins*—dorsal spines strong, the fourth to the seventh of about the same height and the longest equal to half the length of the head; soft portion of the fin higher than the spinous. Pectoral rounded, half as long as the head: third anal spine longer than the second, and equal to 1/4 or 2/9 of height of body: soft portions of dorsal and anal rather angular: caudal rounded. *Air-vessel*—large, thin, and lanceolate in shape. *Colours*—brassy-brown blotched with darker, and having the extremity of the caudal and the pectoral of a dirty yellowish-white: the other fins are of a slate colour.

This fish varies considerably with age; and Dr. Günther, under the designation of *Lobotes auctorum*, gives as its range, "Atlantic coasts of America from New York to the coast of Surinam; Carribean sea; Ceylon, Bay of Bengal, Sunda, Molucca, and Chinese seas."—Catal. i, p. 338.

Habitat.—East coast of Africa, seas of India to the Malay Archipelago and beyond, attaining at least $2\frac{1}{2}$ feet in length. It is excellent as food.

Genus, 21—Scolopsis, *Cuv. and Val.*

Scolopsides, Cuv.

Branchiostegals five: pseudobranchiæ. Body oblong. Eyes of moderate or large size. Mouth moderately protractile: jaws of nearly equal length anteriorly: cleft of mouth horizontal. Infraorbital arch with a spine directed backwards: preopercle as a rule serrated, and often the suborbital ring: opercle with a weak spine. A single dorsal fin with ten spines: anal with three: caudal emarginate or forked. Scales ctenoid. Air-vessel without any constriction, simple. Pyloric appendages few.

Geographical distribution.—From the Red Sea, and East coast of Africa, through the seas of India to the Malay Archipelago and beyond. The largest numbers and greatest varieties of species in this Genus are taken off the coasts of Sind and Bombay, also at the Andamans and Nicobars.

SYNOPSIS OF SPECIES.

1. *Scolopsis bimaculatus*, D. $\frac{10}{9}$, A. $\frac{3}{7}$, L. l. 48, L. tr. $4\frac{1}{2}$/14. Greyish, a broad white opercular band: two black blotches on the lateral-line, the first from the eleventh to the twenty-second scale: the second behind the end of the dorsal fin. Red Sea, seas of India to China.

2. *Scolopsis phæops*, D. $\frac{10}{9}$, A. $\frac{3}{7}$, L. l. 46-48, L. tr. 5/16. A light band along the base of the dorsal fin: a blue band from the eye to the upper jaw; a second to the axilla where it ends in a blue spot. East coast of Africa, and seas of India.

3. *Scolopsis bilineatus*, D. $\frac{10}{9}$, A. $\frac{3}{7}$, L. l. 46, L. tr. 4/14. A white band from snout to base of dorsal spines: a second from above the orbit to a little way below the last dorsal spine: a third from the upper edge of the eye to the lateral-line. A wide yellow, black-edged band from the mouth to the soft dorsal. A large yellow blotch below the last half of the soft dorsal, which latter is anteriorly edged with black: anal with its front half black. Andamans and Malay Archipelago.

4. *Scolopsis ghanam*, D. $\frac{10}{9}$, A. $\frac{3}{7}$, L. l. 46, L. tr. 4/14. A light band from the snout to the base of the dorsal spines: a second from above the eye to the end of the dorsal fin: a third from the eye to the shoulder where it divides into two and is continued backwards: a black spot in the axilla. Red Sea and Andamans.

5. *Scolopsis monogramma*, D. $\frac{10}{9}$, A. $\frac{3}{7}$, L. l. 44, L. tr. 5/14. A deep black band from the eye to above the base of the caudal fin. Andamans to the Malay Archipelago.

6. *Scolopsis cancellatus*, D. $\frac{10}{9}$, A. $\frac{3}{7}$, L. l. 44, L. tr. $3\frac{1}{2}$/14. A white streak from snout to first dorsal spine: a second from over orbit to the end of the base of the dorsal: a third from the upper third of the eye to opposite the end of the pectoral: a fourth from the middle of the eye to the upper third of the caudal. Several irregular and wide vertical body bands. A black spot between first and third dorsal spines. Andamans to the Malay Archipelago and beyond.

7. *Scolopsis Vosmeri*, D. $\frac{10}{9}$, A. $\frac{3}{7}$, L. l. 42-44, L. tr. $3\frac{1}{2}$-4/14. Serrations on preopercle directed backwards in the immature, outwards in the adult. A light band over the opercles, and a longitudinal light line along the body. Red Sea, seas of India to the Malay Archipelago and beyond.

8. *Scolopsis leucotænia*, D. $\frac{10}{9}$, A. $\frac{3}{7}$, L. l. 39, L. tr. $3\frac{1}{2}$/13. A light band edged with dark above and below, going from the eye to the upper half of the caudal fin: usually a dark spot on the dorsal fin. Bombay to the Malay Archipelago.

9. *Scolopsis ciliatus*, D. $\frac{10}{9}$, A. $\frac{3}{7}$, L. l. 40, L. tr. 4/15. A silvery line from between the lateral-line and the back, from near the head to the commencement of the soft dorsal: most of the scales below the lateral-line with a golden spot. Andamans to the Malay Archipelago and beyond.

1. Scolopsis bimaculatus, Plate XXII, fig. 1.

Rüppell, Atl. Fische, p. 8, t. ii, f. 2, and N. W. Fische, p. 126; Günther, Catal. i, p. 357; Klunz. Verh. z. b. Ges. Wien, 1870, p. 740; Bleeker, Revis. Scolop. p. 367.

Scolopsides bimaculatus, Cuv. and Val. v, p. 340.

Scolopsides inermis, Cuv. and Val. v, p. 340; Richards. Ich. China, p. 236, (not Tem. and Schleg.)

Scolopsides monogramma, Bleeker, Sciæn. p. 29, (ex parte.)

B. v, D. $\frac{10}{9}$, P. 18, V. 1/5, A. $\frac{3}{7}$, C. 17, L. l. 48, L. tr. $4\frac{1}{2}$/14.

Length of head about 1/4, of caudal 1/6, height of body 4/13 to 2/7 of the total length. *Eyes*—diameter 1/3 of length of head, 1 diameter from end of snout, and 3/4 apart. The maxilla reaches to nearly beneath the front edge of the orbit. Preorbital 1/2 as high as the diameter of the orbit, having a strong spine, with four or five denticulations along the posterior margin of its plate. Vertical limb of preopercle serrated, most strongly so at the angle. *Teeth*—fine. *Fins*—dorsal spines strong, the fourth the highest being rather longer than the post-orbital portion of the head. Pectoral nearly as long as the head. Second anal spine stronger but shorter than the third, which equals one-third the length of the head: caudal lunated. *Colours*—greyish, becoming dull white on the abdomen: a broad light opercular band. Branchiostegal membranes blood-red. A brownish band over the snout, and one or two blotches on the lateral-line, the first large, being from the eleventh to the twenty-second scales, the second smaller and behind the posterior extremity of the dorsal fin, or the two may be conjoined. Fins orange, becoming reddish externally. Eyes silvery.

Habitat.—Red Sea, seas of India and China. The specimen which is figured was captured at Madras in June, 1867, and is nearly $8\frac{1}{2}$ inches in length. Instead of having a long single blotch on the side, it has taken the form of two distinct ones.

2. Scolopsis phæops, Plate XXII, fig. 2.

Scolopsides phæops, Bennett, Proc. Zool. Soc. 1831, i, p. 165.

Scolopsis phæops, Günter, Catal. i, p. 358.

Scolopsis nototænia, Playfair, Fish. Zanz. p. 29, pl. v, fig. 2.

B. v, D. $\frac{10}{9}$, P. 16, V. 1/5, A. $\frac{3}{7}$, C. 17, L. l. 46-48, L. tr. 5/16.

Length of head 1/4 to $4\frac{1}{3}$, of caudal nearly 1/5, height of body $3\frac{2}{3}$ to $3\frac{1}{4}$ in the total length. *Eyes*—diameter 2/9 of length of head, $1\frac{1}{2}$ diameters from end of snout, and $1\frac{1}{3}$ apart. Interorbital space rather convex transversely. Cleft of mouth somewhat oblique, the maxilla reaching to below the front edge of the orbit. Preorbital spine of moderate size, with a strong denticulation on the posterior-inferior edge of the plate. Vertical limb of preopercle slightly emarginate, the angle being rounded and somewhat produced: on the vertical limb the serrations are strongest, superiorly decreasing in strength to above the angle where they become almost spinate. *Teeth*—in the jaws fine. *Fins*—dorsal spines of moderate strength, increasing in length to the fourth which equals 1/3 of the height of the body. Pectoral equals the length of the head excluding the snout: third anal spine longer but not quite so strong as the second, and equalling 2/7 of the height of the body: caudal forked, upper lobe somewhat the longer. *Colours*—greenish-olive above the lateral-line, becoming yellowish-white below it: a narrow light band runs along the back close to the base of the dorsal fin. A wide bright blue band passes from the eye over the preorbital and upper maxillary bone ceasing a short distance between the centre of the upper jaw and the angle of the mouth: a second goes from the posterior edge of the eye to the axilla where it ends in a blue spot: fins reddish.

In the dried skin shown me in the British Museum of *S. nototænia*, Playfair, and as I understood the type, the anal spines are correctly described as " the two last spines are nearly equal in length, but the second is the stronger, they are about one-third of the length of the head :" (Fish. Zanz. p. 30,) but they have evidently been injured and grown again in an irregular manner.

Habitat.—East coast of Africa, seas of India. Not uncommon off Sind. The specimen figured is $9\frac{1}{2}$ inches in length.

3. Scolopsis bilineatus, Plate XXII, fig. 3.

Anthias bilineatus, Bloch, t. 325, fig. 1; Bl. Schn. p. 306.

Lutjanus ellipticus, Lacép. iv, p. 213.

Scolopsides bilineatus, Cuv. and Val. v, p. 336; Bleeker, Verh. Bat. Gen. xxiii, Sciæn. p. 28.

Scolopsides lineatus, Bleeker, Solor. p. 73, (not Rüpp.)

Scolopsis bilineatus, Günther, Catal. i, p. 357; Bleeker, Revis. Scolop. p. 359.

Scolopsis Bleekeri, Günther, Catal. i, p. 361.

B. v, D. $\frac{10}{9}$, P. 16, V. 1/5, A. $\frac{3}{7}$, C. 17, L. l. 46, L. tr. 4/14, Cæc. pyl. 5.

Length of head 1/4 or a little less, of caudal 1/5, height of body 2/7 of the total length. *Eyes*—diameter 4/11 to 2/5 of length of head, 2/3 of a diameter from end of snout, and 1 apart. The maxilla reaches to below the front edge of the orbit or even to its first third in the adult. Vertical limb of preopercle serrated, and its angle

rather produced and rounded. A strong preorbital spine, with three teeth below it along the edge of the plate. Opercular spine distinct. *Teeth*—villiform. *Fins*—dorsal spines not strong, increasing in height to the fourth which equals 3/7 of the height of the body. Pectoral extends nearly to above the anal spines, the second of which is very strong, longer than the third, and equal to rather more than half of the height of the body: soft dorsal and anal angularly rounded; caudal forked. *Colours*—a white band from the snout to the base of the dorsal spines: a second from above the orbit to a little way below the last dorsal spine: a third from the upper edge of the eye to the lateral-line. A wide yellow, black-margined band passes from the mouth to the commencement of the soft dorsal fin. A large yellow blotch exists below the last half of the soft dorsal, which latter fin is anteriorly edged with black: anal black in its front half and white posteriorly.

In the young, *S. Bleekeri*, Günther, the light band bordered with black is nearly straight, and terminates where the white spot exists in the adult, near the end of the base of the soft dorsal: another light band proceeds from the upper edge of the eye to the base of the spinous portion of the dorsal fin; whilst a third median one goes from the snout to the base of the first dorsal spine.

Habitat.—Andamans and Malay Archipelago. The specimen is figured life-size.

4. Scolopsis ghanam, Plate XXII, fig. 4.

Sciæna ghanam, Forsk. p. 50, No. 56.
Holocentrus ghanam, Lacép. iv, p. 347.
Scolopsis lineatus, Rüpp. Atl. Fische, p. 7, pl. 2, fig. 1, and N. W. Fische, p. 126.
Scolopsides ghanam, Cuv. and Val. v, p. 348.
Scolopsis ghanam, Günther, Catal. i, p. 362; Klunzinger, Verh. z. b. Ges. Wien, 1870, p. 739.

B. v, D. $\frac{10}{9}$, P. 17, V. 1/5, A. $\frac{3}{7}$, L. l. 46, L. tr. 4/14, Cæc. pyl. 6 (4).

Length of head 1/4 to $4\frac{1}{3}$, of caudal 1/5, height of body $3\frac{1}{2}$ to $3\frac{2}{3}$ in the total length. *Eyes*—diameter 1/3 of length of head, 3/4 of a diameter from end of snout, and 1 apart. Scaleless portion of the head covered with numerous small pores. The maxilla reaches to below the first fourth of the orbit. Preorbital spine strong. the plate denticulated on the edge beneath it: lower edge of suborbital ring of bones serrated. Vertical limb of preopercle strongly serrated, most coarsely so upon its produced angle. Opercular spine well developed. Shoulder-bone serrated. *Teeth*—fine. *Fins*—the dorsal spines which are rather weak increase in length to the fifth, the height of which nearly equals half the length of the head. Pectoral not quite so long as the head: anal spines of equal strength, the longest equalling the extent of the postorbital portion of the head: caudal deeply forked. *Lateral-line*—curves to opposite the end of the dorsal fin, from whence it proceeds direct to the centre of the caudal. *Colours*—back olive, a yellowish-white band goes from the snout to the base of the dorsal spines: a second from above the orbit to the end of the base of the dorsal fin: a third from the snout, where it arises in common with the one for the opposite side, passes through the upper portion of the eye and at the shoulder divides into two, one being above the lateral-line and becoming lost on the back of the tail, the other going below the lateral-line being lost on the last fourth of the body: a fourth goes along the preorbital and suborbital ring of bones being lost above the base of the pectoral fin which has a black spot in its axil. Most of the scales below the lateral-line in the anterior two-thirds of the body have a black spot at their bases. A violet mark is present at the base of either lobe of the caudal fin.

Habitat.—Red Sea and Andaman islands, where it is very common. Specimen figured is $6\frac{7}{10}$ inches in length.

5. Scolopsis monogramma, Plate XXII, fig. 5.

Scolopsides monogramma. (Kuhl. and v. Hass.) Cuv. and Val. v, p. 338.
Scolopsis monogramma, Günther, Catal. i, p. 358; Bleeker, Revis. Scolop. p. 369.

B. v, D. $\frac{10}{9}$, P. 17, V. 1/5, A. $\frac{3}{7}$, C. 17, L. l. 44, L. tr. 5/14.

Length of head 1/4, of caudal 1/5, height of body 4/15 of the total length. *Eyes*—diameter 1/3 of length of head, nearly 1 diameter from end of snout and also apart. Upper surface of the head flat, and the scales extend forwards nearly to the nostrils. Preorbital bone with one flat spine having three small teeth at the anterior-inferior edge of the plate, the depth of which equals half the diameter of the orbit: infraorbital ring of bones finely serrated. The maxilla reaches to below the front edge of the orbit. Vertical limb of preopercle almost evenly serrated as well as its rounded and somewhat produced angle. Shoulder-bone serrated. *Teeth*—villiform. *Fins*—dorsal spines slender, increasing in length to the fourth which equals 3/7 of the height of the body. Second anal spine stronger but not so long as the third which equals 3/10 of the height of the body: caudal forked. *Lateral-line*—makes a very gradual curve to below the end of the soft dorsal fin. *Colours*—olive with a deep black band, one scale wide, passing from the snout through the eye to above the base of the caudal fin, until it arrives below the end of the dorsal fin it is inferior to the lateral-line: fins immaculate.

Habitat.—Andamans to the Malay Archipelago. Specimen figured is 5 inches long.

6. Scolopsis cancellatus, Plate XXII, fig. 6.

Scolopsides cancellatus, Cuv. and Val. v, p. 351;* Bleeker, Sciæn. p. 28.

* It is suggested by Cuv. and Val that *Scolopsis lineatus* Quoy and Gaim. Voy. de M. Freycinet, Zool. pl. 60, f. 3, may be this species badly delineated.

Scolopsis cancellatus, Günther, Catal. i, p. 361, and Fische d. Sudsee, p. 30; Bleeker, Atl. Ich. Perc. t. xxxi, fig. 2, and Revis. Scolop. p. 355.

Scolopsis Bleekeri, Bleeker, Atl. Ich. Perc. t. xvi, fig. 1, (not Günther.)

B. v, D. $\frac{10}{9}$, P. 15, V. 1/5, A. $\frac{3}{7}$, C. 17, L. l. 44, L. tr. $3\frac{1}{2}$/14.

Length of head 1/4, of caudal 2/9, height of body 1/4 of the total length. *Eyes*—diameter 2/5 of length of head, 1/2 a diameter from end of snout, and 3/4 apart. Dorsal profile more convex than that of the abdomen. Interorbital space flat. Scaleless portion of the head studded with fine open pores. The maxilla reaches to below the front edge of the orbit. Preorbital spine of moderate length and strength, fluted and with one or two denticulations along the inferior edge of the plate. Some serrations on the suborbital ring of bones. Vertical limb of preopercle serrated, most coarsely so superiorly and at its slightly produced and rounded angle. *Teeth*—fine. *Fins*—dorsal spines weak, increasing in length to the fifth which is more than half as long as the head: pectoral as long as the head behind the front edge of the orbit: second anal spine stronger but a little shorter than the third which equals half the length of the head, *Lateral-line*—curves to opposite the end of the dorsal fin, from whence it proceeds direct to the centre of the caudal. *Colours*—greyish above and whitish below the lateral-line: a white streak goes from the snout to the base of the first dorsal spine: a second from over the orbit to the end of the base of the dorsal fin: a third from the upper third of the eye to opposite the end of the pectoral: a fourth from the middle of the eye to the upper third of the caudal. Several wide but irregular vertical bands pass from the back to the middle of the body. A black spot between the first and third dorsal spines in their lower half. Bleeker observes that the longitudinal bands are more distinct and regular in the young than in the adult, whilst the black spot on the spinous dorsal usually disappears with age.

Habitat.—Andamans, to the Malay Archipelago, and beyond. The specimen is figured life-size.

7. Scolopsis Vosmeri, Plate XXIII, fig 1 (young): 2 (semi-adult): 3 (adult).

Anthias Vosmeri, Bloch, t. 321.
Anthias Vosmari, Bl. Schn. p. 304.
Anthias Japonicus, Bloch, t. 325, f. 2; Bl. Schn. p. 307.
Perca aurata, Mungo Park, Trans. Linn. Soc. iii, p. 35.
Lutjanus Japonicus, Lacép. iv, p. 31.
Lutjanus Vosmeri, Lacép. iv, p. 213.
Lutjanus aureovittatus, Lacép. iv, p. 216.
Pomacentrus enneadactylus, Lacép. iv, pp. 505, 508.
Lutjanus auratus, Bl. Schn. p. 328.
Sparus kurite, Russell, Fish. Vizag. ii, p. 5, pl. 106.
Scolopsides kurite, Cuv. and Val. v, p. 331.*
Scolopsis kurite, Rüpp. Atl. Fische, p. 9, t. 2, f. 3.
Scolopsis kate, Cuv. and Val. v, p. 329.
Scolopsides Rüppellii, Cuv. and Val. v, p. 332†; Richards. Ich. China, p. 236.
Scolopsides vosmeri, Cuv. and Val. v, p. 333‡; Bleek. Verh. Bat. Gen. xxiii, Sciæn. p. 27.
Scolopsides torquatus, Cuv. and Val. v, p. 335; Bleeker, l. c. p. 28.
Scolopsis torquatus, Günther, Catal. i, p. 356; Kner, Novara, Fische, p. 59; Bleeker, Revis. Scolopsis, p. 363.
Scolopsides aurata, Cantor, Catal. i, p. 81.
Scolopsis Japonicus, Günther, Catal. i, p. 354; Day, Fish. Malabar, p. 25; Klunz. Verh. z. b. Ges. in Wien, 1870, p. 740.
Scolopsis auratus, Günther, Catal. i, p. 355.
Scolopsis Vosmaeri, Bleeker, Revis. Scolop. p. 361.
Kundul, Tam.

B. v, D. $\frac{10}{9}$, P. 17, V. 1/5, A. $\frac{3}{7}$, C. 17, L. l. 42-44, L. tr. $3\frac{1}{2}$-4/13-14, Cæc. pyl. (3 Kner.)

Length of head 1/4 to 3/14, of caudal 4/21 to 2/9, height of body 1/3 to 2/5 of the total length. *Eyes*—diameter 2/5 to 1/3 (in the adult) of length of head, 2/3 of a diameter from end of snout, and 3/4 to 1 apart. The maxilla reaches to below the anterior fourth or in the adult to beneath the front edge of the orbit. Preorbital with rather a deep plate, armed superiorly with one strong fluted spine projecting backwards and from about three to seven or eight denticulations below it: above this spine the suborbital plate is armed with another directed both forwards and backwards, in some specimens these are very small, especially the anterior one. In one specimen this anterior projection of the suborbital spine is imperceptible, so it is probable that Sir John Richardson's statement of "two suborbital teeth pointing backwards, one under the other and more slender, none pointing forwards," may have been quite correct: it is scarcely necessary to observe that he considered the preorbital spine as a suborbital one. Preopercle with its vertical limb slightly emarginate, due to its projecting

* Cuv. and Val. remark upon Russell's figure showing 10 soft rays in the dorsal fin, and his description giving 11, consequently a new name was bestowed on the species, which however only possesses 9 rays.

† Cuv. and Val. bestowed this designation on Rüppell's fish because the vertical limb of the preopercle is not shown so emarginate as figured by Russell and as existing in nature.

‡ *Scolopsis argyrosomus*, Kuhl and v. Hass. MSS. apud Cuv. and Val.

and rounded angle: it is serrated in its whole extent, but the character of these serrations alters considerably with age. In the young, *S. torquatus*, the serrations are moderately coarse and directed backwards, sometimes a small cusp exists at the base of some, at other times it does not, the vertical limb and rounded angle may be said to be serrated, the serrations being directed backwards. As the size of the specimen augments, *S. Japonicus*, we find that these basal cusps begin to be more distinctly developed, and a blunt one as a rule is present at the base of every serration, in some specimens the posteriorly directed teeth now begin to disappear. As the adult, *S. auratus*, is reached the appearance becomes remarkable, the posteriorly directed serrations on the vertical limb (not on the angle) have become absorbed, and the cusps at their bases have augmented in size and consequently the serrations project outwards instead of backwards. Opercle with a moderately developed spine. *Teeth*—generic. *Fins*—dorsal spines strong, each alternate one being broader, they increase in length to the fourth or fifth, from whence they continue of about the same height, or equal to about half the length of the head, whilst the rays are of about the same height. Pectoral equal to the length of the head posterior to the nostrils: ventral almost reaching the anus. Anal spines strong, the third nearly equal to the highest in the dorsal fin but one-fourth shorter than the second in a specimen $8\frac{1}{2}$ inches in length; in younger specimens the difference in length is sometimes not so great, in such cases the second spine is generally the longer, as will be alluded to: caudal forked. *Colours*—adult of a pale dull-red, usually having a whitish band round the opercles, from the upper edge of which bone a longitudinal wide line of the same colour passes backwards below the lateral-line, being lost beneath the end of the base of the dorsal fin. Every scale on the body has generally a dark basal mark. In the medium size fish, *S. Japonicus*, the ground colour is often the same as given for the adult, but in others it is of an ashy grey: the opercular band is generally distinct and of a cream-yellow colour. A deep arterial blood-red spot exists behind the opercular spine, and the fins are of a pale yellow. In the young, *S. torquatus*, the band of the opercles is very distinct and of a light lemon-yellow colour, whilst the blood-red spot behind the opercular spine is very well marked: the inside of the mouth is likewise red.

If we divide this fish into three distinct species merely in accordance with the colours observed, the difficulty arises amongst specimens from India, of ability to discover any very young *S. auratus* or *S. Japonicus*, unless the *S. torquatus* is admitted to be such. Of course, however, it is by no means improbable that some immature might from the first adopt the livery seen in the adult, but such a mere anomaly would be insufficient to constitute a valid species. In Cuvier and Valenciennes, it is observed that Ruppell's figure of *S. kurite*, does not show such an emargination of the preopercle as is exhibited in Russell's, this however appears to have been merely an accident. The question of the direction of the preopercular serrations deserves however more consideration, and it was not until I had collected a large number of specimens of all ages and examined those in the British and Madras Museums, that I arrived at the conviction that such were merely due to maturity or the reverse of the specimen. In the young, although the serrations project backwards, they have a small cusp at their base, which, did it grow, would project outwards: in middle age this outer projection increases in development whilst the posterior one shows signs of atrophy: in the adult stage the change is completed, the earliest serrations have become almost or entirely absorbed, the original basal cusp has developed into an outwardly directed serration, having sometimes the original ones in the form of a backwardly projecting cusp at the base of each.

Bleeker, *l. c.* places *S. torquatus* as nearly allied but distinct from *S. Vosmeri*, being distinguished from it by a more convex profile, a larger head, larger eyes and a lower anal fin. In colours by an absence of the light lateral band and a purple triangular spot at the base of the pectoral fin. He gives in *S. torquatus* length of head 4 to $4\frac{1}{5}$, height of body $2\frac{2}{3}$ to 3 in the total length; eyes, diameter 2 to $2\frac{1}{2}$ in the length of head: in the *S. Vosmeri*, length of head $4\frac{1}{3}$ to $4\frac{2}{3}$, height of body $2\frac{3}{4}$ to 3 in the total length; eyes, diameter $2\frac{2}{3}$ to 3 in the length of head.

Pl. xxiii, fig. 1, represents a specimen of *S. torquatus*, life-size, no longitudinal band exists and the pectoral blotch is distinct, but the comparative length of the second anal spine is as great as in any specimen of the typical *S. Vosmeri*, which I have seen. In four other specimens 6, $6\frac{1}{10}$, $6\frac{1}{2}$, and 7 inches respectively in length, the second anal spine is only 1/2 the length of the head. Therefore variations do exist, and to prove such I have figured (Pl. xxiii, fig. 2) an intermediate form, $6\frac{1}{2}$ inches in length, which agrees with Bleeker's *torquatus*.

Habitat.—Red Sea, East coast of Africa, seas of India to the Malay Archipelago and beyond, attaining at least 12 inches in length.

8. Scolopsis leucotænia, Plate XXIII, fig. 4.

Scolopsides leucotænia, Bleeker, Banka, p. 451, Atl. Ich. Perc. t. xvi, fig. 4, and Revis. Scolop. p. 351; Günther, Catal. i, p. 363.

Scolopsides leucotænioides, Bleeker, Celebes, p. 439; Günther, Catal. i, p. 363.

B. v, D. $\frac{10}{9}$, P. 17, V. 1/5, A. $\frac{3}{7}$, L. l. 39, L. tr. $3\frac{1}{2}$/13.

Length of head equals one fourth less than the height of the body. *Eyes*—diameter 2/5 of length of head, 1/2 a diameter from end of snout, and 1 apart. Interorbital space flat: dorsal profile more convex than that of the abdomen. Cleft of mouth somewhat oblique: the maxilla reaches to below the first third of the orbit. Preorbital one-third as high as the diameter of the eye, its spine weak, and the hind edge of the plate with a few indistinct serrations: suborbital ring of bones serrated. Vertical limb of preopercle slightly emarginate, serrated along its whole extent but most coarsely so at its rounded angle. Shoulder-bone serrated. *Teeth*—fine.

Fins—dorsal spines strong, increasing in length to the fourth which equals half the length of the head: pectoral equals the length of the head without the snout: the ventral nearly reaches the anal: second anal spine much the strongest and considerably the longest, equalling the length of the head behind the middle of the eye. *Colours*—a broad yellowish-white streak from above the eye to the upper edge of the free portion of the tail, it is margined both above and below with a dark purple stripe: above it the body is reddish-brown, below it yellowish: a dark purplish vertical band extends down the opercle. Fins reddish, the dorsal with a fine black upper edge and a dark band along the centre of its spinous portion.

In the typical *S. leucotænia*, no black mark exists on the dorsal fin, and the second anal spine is longer and stronger than the third.

In *S. leucotænioides* a black blotch exists between the first and fourth dorsal spines, and the second and third anal spines are of about equal length and strength.

In the specimen figured, a dark band passes along the spinous dorsal and the anal spines are as in *S. leucotænia*.

Habitat.—Bombay to the Malay Archipelago.

My single specimen having its tail injured must be the excuse for the way in which I have given the proportions, but Bleeker observes, length of head 1/4, height of body 2/7 to 1/4 of the total length.

9. Scolopsis ciliatus, Plate XXIII, fig. 5.

Holocentrus ciliatus, Lacép. iv, pp. 333, 371.
Scolopsides lycogenis, Cuv. and Val. v,* p. 346, pl. 127; Bleeker, Sciæn. p. 27.
Scolopsis ciliatus, Günther, Catal. i, p. 355.

B. v, D. $\frac{10}{9}$, P. 17, V. 1/5, A. $\frac{3}{7}$, C. 17, L. l. 44, L. tr. $3\frac{1}{2}$-4/15, Cæc. pyl. 5, Vert. 10/14.

Length of head 1/4 to $4\frac{1}{2}$, of caudal nearly 1/5, height of body $3\frac{1}{3}$ to $3\frac{1}{2}$ in the total length. *Eyes*—diameter 2/5 to 3/8 of length of head, 2/3 of a diameter from end of snout, and 1 apart. A prominent ridge having a serrated edge exists on the maxilla, and that bone extends to below the front margin of the orbit. Preorbital with a strong spine directed backwards, two smaller ones on the plate below it and a few serrations beneath. Vertical edge of preopercle serrated, most strongly so at its angle which is not produced. A conspicuous spine on the opercle: shoulder-bone serrated. *Teeth*—villiform. *Fins*—dorsal spines slender, increasing in length to the fifth, the height of which nearly equals half the length of the head: anal spines not strong, the third weaker but longer than the second, and nearly equalling the longest in the dorsal fin: caudal forked. *Colours*—greenish-olive above, becoming lighter on the abdomen: a silvery white band extends between the lateral-line and the back, from near the head to opposite the commencement of the soft dorsal: the position of this white line Bleeker observes is liable to change with age: the scales below the lateral-line have a golden spot. Fins reddish.

Habitat.—Andamans, Malay Archipelago, &c. The specimen figured is 7 inches in length and from the Andaman islands.

Genus, 22—Dentex, *Cuv.*

Gymnocranius, pt. Klunz.: *Paradentex*, pt. Blkr.: *Synagris*, (Klein) Bleeker.

Branchiostegals six or seven: pseudobranchiæ. Body oblong, rather elongate, and a little elevated. Eyes of medium or rather large size. Mouth moderately protractile, its cleft more or less horizontal: jaws of about equal length. Preopercle entire or feebly serrated: opercle without any or with a not very prominent spine: the distance between the eye and the angle of the mouth considerable. Generally strong canines from 4 to 6 in number in both jaws, almost invariably present in the upper: a conical outer lateral row in either jaw: vomer, palate, and tongue edentulous. One scaleless dorsal fin having from 10 to 13 spines, anal with three and nine to eleven rays: the spines generally weak, and being more or less provided with a scaly groove: caudal forked. Scales ctenoid, of moderate size, more than three rows between the eye and the angle of the preopercle, none on the front of the snout, jaws, or preorbital. Air-vessel not constricted but notched posteriorly. Pyloric appendages few.

This Genus has been subdivided from *Synagris*, mostly owing to the existence of upwards of three rows of scales across the preopercle. Even thus restricted it has been further subdivided and *Gymnocranius*, Klunz.= *Paradentex*, Bleeker, consists of those species in which the scales do not extend forward on the upper surface of the head so far as the eye: none on the outer limb of the preopercle: the upper jaw is rather more protractile, and the canines are weaker.

Geographical distribution.—The fishes of this Genus have a wide range, being found in the Mediterranean, Atlantic, Red Sea, and through those of India to the Malay Archipelago, and beyond.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Dentex rivulata*, D. $\frac{10}{10}$, A. $\frac{3}{10}$. Canines in both jaws. Sinuous blue lines on the sides of the head. Red Sea, Ceylon.

* *Lycogenis argyrosoma*, Kuhl. and v. Hass. Mss. apud Cuv. and Val.

1. Dentex rivulatus.

Rüpp. N. W. Fische, p. 116, t. 29, fig. 2; Günther, Catal. i, p. 372.
Gymnocranius rivulatus, Klunz. Verh. z. b. Ges. Wien, 1870, p. 765.

D. $\frac{10}{10}$, P. 15, V. 1/5, A. $\frac{3}{10}$, C. 17, L. l. 48, L. tr. 7/20.

Length of head 4/17, of caudal 2/11, height of body 3/10 of the total length. *Eyes*—diameter 3/11 of the length of head, $1\frac{2}{3}$ diameters from the end of snout, and $1\frac{1}{4}$ apart. The depth of the preorbital rather exceeds the length of the diameter of the orbit. The maxilla reaches to below the front nostril. Hind limb of preopercle almost vertical and entire, a few serrations exist along its rounded angle. *Teeth*—an outer row of strong canines in the upper jaw, and a strong lateral row of conical ones: lower jaw with six canines in front and a lateral conical row which posteriorly become rather obtuse. *Fins*—dorsal spines rather strong, increasing in length to the fourth from whence they decrease to the last, the height of the fourth equals the distance from the eye to the end of the preorbital bone, the last dorsal spine equals the length of the third and is slightly longer than the ninth: second anal spine two-thirds as long as the third which equals the length of the post-orbital portion of the head: caudal deeply forked. *Scales*—five rows on the cheeks: superiorly they do not extend so far as to opposite the posterior edge of the orbit. *Colours*—greenish, glossed with golden on the sides: wavey blue lines along the snout and over the preorbital.

Habitat.—Red Sea and Ceylon.

Genus, 23—Synagris *(Klein) Günther.*

Dentex, pt. Cuv. and Val: *Nemipterus*, Swains.: *Spondyliosoma*, sp. Cantor: *Heterognathon*, pt. Steind.: *Dentex* (C. V.) Bleeker.*

Branchiostegals five or six: pseudobranchiæ. Body oblong, rather elongate and a little elevated. Eyes of medium or rather large size. Mouth moderately protractile, its cleft more or less horizontal: jaws of about equal length. Preopercle entire or feebly serrated: opercle without any or with a not very prominent spine: the distance between the eye and the angle of the mouth considerable.† Moderately sized curved canines in the upper and generally feeble ones in the front of the lower jaw: an inner villiform band in either jaw and usually an outer conical row: vomer, palate, and tongue edentulous. One scaleless dorsal fin having ten spines and nine rays: anal also scaleless having three spines and seven rays: all the spines weak: caudal forked. Scales ctenoid, of moderate size, three rows on the preopercle none along its outer border, on the snout, preorbital, or jaws. Air-vessel not constricted but notched posteriorly. Pyloric appendages few.

Swainson's genus *Nemipterus* is founded on *Dentex filamentosus*, C. and V. = *D. striatus* = *Synagris*, Günther, and consequently might perhaps (to prevent further confusion) be employed instead of *Synagris*.

Geographical distribution.—Red Sea, East coast of Africa, seas of India to the Malay Archipelago and beyond.

SYNOPSIS OF SPECIES.

1. *Synagris striatus*, D. $\frac{10}{9}$, A. $\frac{3}{7}$, L. l. 48. Preopercle serrated: only 2 rows of teeth in the lower jaw, no conical ones. Two first dorsal rays and upper lobe of caudal prolonged. Silvery, with purplish bands. Seas of India to Surinam.
2. *Synagris tolu*, D. $\frac{10}{9}$, A. $\frac{3}{7}$, L. l. 48. Preopercle entire. Lateral conical teeth in either jaw. Dorsal spines elongated and interspinous membrane deeply notched. Roseate, with yellow longitudinal bands. Seas of India to the Malay Archipelago.
3. *Synagris Bleekeri*, D. $\frac{10}{9}$, A. $\frac{3}{7}$, L. l. 48. Preopercle entire. No outer conical row in the upper jaw, a single conical lateral row in the mandible. No elongated spines or rays: interspinous membrane slightly notched. A spot on the opercle. Seas of India.
4. *Synagris filamentosus*, D. $\frac{10}{9}$, A. $\frac{3}{7}$, L. l. 48. Preopercle serrated. A lateral outer row of small conical teeth in the upper jaw only. Upper caudal lobe prolonged: interspinous membrane slightly notched. Yellowish-red, with roseate longitudinal bands. Seas of India.
5. *Synagris notatus*, D. $\frac{10}{9}$, A. $\frac{3}{7}$, L. l. 47. Preopercle entire. An outer row of small conical teeth in the upper jaw, also a similar row in the mandible, but becoming very small in the last fourth of the jaw. No elongated spines or rays; interspinous membrane slightly notched. A brilliant spot on the first 5 scales below the lateral-line. Andamans.

1. Synagris striatus, Plate VIII, fig. 5.‡

? *Coryphæna striata*, Bl. Mss.
? *Coryphæna lutea*, Bl. Schn. p. 297, t. lviii.
Dentex striatus, (? Cuv. and Val. vi, p. 252); Jerdon, M. J. L. and Sc. 1851, p. 134.

* Genus *Synagris* (Klein) Bleeker = *Dentex* (C. V.) Günther in part, and is not similar to *Synagris*, Günther.

† The preorbital in the following species of this genus is high and consists of two pieces, the posterior of which ends in a point at its posterior-superior angle, but this point, which is of varying extent, does not form a spine as in the genus *Scolopsis*. The posterior border of this preorbital plate is free, the skin covering it not passing directly on to the cheeks, but being first reflected on to the posterior surface of the plate.

‡ Marked *Synagris luteus* on the plate.

Dentex filamentosus, Cuv. and Val. vi, p. 244, pl. 155 (not Val. Isles Canar. nor *Cantharus filamentosus*, Rüpp.)

Nemipterus filamentosus. Swains. Fish. ii, p. 223.

? *Synagris luteus*, Günther, Catal. i, p. 380.

Synagris macronemus, Günther, Catal. i, p. 380.

B. vi, D. $\frac{10}{9}$, P. 17, V. 1/5, A. $\frac{3}{7}$, C. 17, L. l. 48, L. tr. $3\frac{1}{2}$/10.

Length of head $4\frac{1}{3}$, of caudal (without its prolongation) $4\frac{3}{4}$, height of body one-fourth of the total length (excluding the prolonged caudal ray). *Eyes*—diameter $3\frac{1}{4}$ in length of head, 1 diameter from end of snout, and 2/3 of a diameter apart. The height of the head equals its length exclusive of the opercle: lower jaw slightly the longer: the maxilla reaches to below the front edge of the orbit. Height of preorbital equals 2/3 of the diameter of the eye, it terminates posteriorly in a point below the last third of the eye. Vertical limb of preopercle finely and evenly serrated in its middle third, its angle rounded and entire. Opercle without any distinct spine. *Teeth*—villiform along the whole of the upper jaw, with 4 canine-like ones anteriorly in either premaxillary, laterally the outer row is composed of about 30 closely set conical ones: the inner ones in the mandible are villiform just above the symphysis, whilst laterally they are in two rows of which the inner is slightly the larger. *Fins*—dorsal spines rather weak, the two first elongated, the second reaching to the base of the caudal fin: interspinous membrane very slightly notched, the height of the last eight spines gradually increases, the last equalling rather more than the length of the postorbital portion of the head but is not so high as the rays. Pectoral as long as the head. Ventral reaches the anal. Third anal spine the longest, and equalling 1/3 of the length of the head. Caudal forked, upper lobe with a filamentous prolongation. *Scales*—extend forwards superiorly to between the eyes. *Lateral-line*—the tubes divide posteriorly into two branches. *Colours*—silvery, with pinkish longitudinal bands: fins pinkish stained with yellow.

The specimen described and figured is from Sir W. Elliot's Madras collection, the coloured figure is named *Dentex striatus* C. V. by Jerdon, and is alluded to in M. J. L. and Sc. 1851, p. 134.

This species, a specimen of which, from Vizagapatam, has been given me by Sir Walter Elliot, cannot be *Spondyliosoma gulimindu* (C. V.) Cantor,* Catal. p. 50, which is not Russell's *Sparus lama gulimindu*=*Synagris tolu*, of which I have both male and female specimens. It is very similar to *S. Japonicus*, but (irrespective of the spines being weaker and longer, it has only 9 instead of 10 rows of scales between the lateral-line and the base of the anal fin). I have a male of that species which has no prolongation of the dorsal fin. There are two of Bloch's specimens marked *Dentex luteus* at Berlin, one evidently the skin from which Bl. Schn.'s figure has been taken, the artist not having reversed it, whilst he has delineated the eye too small, and the (?) elongated dorsal spines are broken. On the second specimen, which has no elongated dorsal spine, is Val.'s label, "C'est le vrai *C. lutea*, Bl. Schn." Bloch's may be this species, but it has several rows of villiform teeth in the mandibles of about the same size and very similar to *S. Japonicus*, which it appears to resemble. This (*Synagris striatus*) is certainly Jerdon's *Dentex striatus*.

Bl. Schn.'s figure is probably coloured from a description in which it was said to have been striated or banded, and instead of placing such longitudinally he has given them as vertical.

Habitat.—Coromandel coast of India: the specimen figured was captured November 25th, 1852. *Dentex filamentosus*, C.V., came from Surinam.

2. **Synagris tolu**, Plate XXIII, fig. 6.

Sparus lama gulimindu, Russell, Fish. Vizag. ii, p. 6, pl. cvii.

Dentex tolu, Cuv. and Val. vi, p. 249; Bleeker, Spar. p. 13, Atl. Ich. Perc. t. xxvii, fig. i, and Revis. Dentex. p. 20 (not Klunz.)

Cantharus gulimindu, Cuv. and Val. vi, p. 344 (not *Spondyliosoma gulimindu*, Cantor.)

Cundil, Tam.

B. vi, D. $\frac{10}{9}$, P. 17, V. 1/5, A. $\frac{3}{7}$, C. 17, L. l. 48, L. tr. 3/10, Cæc. pyl. 10-11.

Length of head 2/9, of pectoral 1/6, of caudal 2/9 to 1/4, height of body 2/9 to 1/4 of the total length. *Eyes*—transversely oval, diameter 1/3 of length of head, 1 diameter from end of snout, and 2/3 apart. Jaws of equal length, the maxilla reaches to below the front edge of the orbit. The lower edge of the preorbital obliquely convex in its posterior half, its height equals half the diameter of the orbit. Preopercle entire. Opercle with a small flattened spine. *Teeth*—villiform along the whole of the upper jaw, with from 4 to 6 canine-like ones anteriorly in either premaxillary, laterally the outer row is composed of about 16 closely set pointed ones: the inner ones in the mandible also villiform, opposite the symphysis in several rows, laterally in a single one, the outer row in front of the lower jaw is rather larger than the villiform ones, but not so large as the outer lateral row which equals those in the side of the upper jaw. *Fins*—dorsal spines very slender and flexible, the interspinous membrane deeply notched. The spines increase in length to the sixth, seventh, and eighth, which equal two-thirds the height of the body, the last spine equals two-fifths of the height of the body and is of the same length as the last ray: pectoral fin as long as the head excluding the snout: ventral with its outer ray elongated, scarcely reaches so far as the anus: second anal spine of equal strength to but not so long

* In Cantor's fish the dentition is slightly different, it has villiform teeth in both jaws, with 5 or 6 small curved canines in the front of the upper jaw, whilst laterally its outer row is slightly enlarged; the canines in front of the lower jaw are very small, whilst laterally the outer row is scarcely larger than the villiform teeth.

as the third which equals one third of the height of the body: caudal deeply forked the upper lobe the longer. As regards sexes the dorsal spines are equally prolonged in males and females: the pectoral is a little longer in the males, extending to the anus, but the caudal lobes are the same. *Colours*—rosy, with four or five yellowish longitudinal bands between the rows of scales from immediately above the base of the pectoral fin. Fins pinkish: tips of dorsal spines orange.

Russell's figure, although defective, is sufficient to distinguish the species by: it is the most common kind in Madras from October to March, and may be at once recognised from the other recorded forms by its long and flexible dorsal spines and deeply emarginate interspinous membrane. The caudal fins of some males examined in October had no filamentous prolongations.

Cuv. and Val. specimens are in good preservation at Paris and coincide with the above described, but not with *Spondyliosoma guliminda*, Cantor, whose type is in the British Museum.

Habitat.—Seas of India to the Malay Archipelago.

3. **Synagris Bleekeri**, Plate XXIV, fig. I.

B. vi, D. $\frac{10}{9}$, P. 17, V. 1/5, A. $\frac{3}{7}$, C. 17, L. l. 48, L. tr. $3\frac{1}{2}$/11.

Length of head one-fourth to 2/9, of caudal $4\frac{2}{3}$, height of body $4\frac{1}{3}$ in the total length. *Eyes*—transversely oval, diameter $3\frac{3}{4}$ in the length of head, $1\frac{1}{4}$ diameters from end of snout, and 1 apart. Interorbital space flat. The maxilla reaches to below the first third of the orbit. Preorbital three-fourths as high as the length of the transverse diameter of the orbit, its posterior margin oblique gradually passing into the inferior one. Preopercle entire. A small flat spine on the opercle. *Teeth*—in villiform bands in the upper jaw, four small canines in the front of each premaxillary, no enlarged lateral row: villiform teeth above the symphysis in the lower jaw, but continued a very short distance laterally, and canine-like teeth in front of the lower jaw, and a single row of conical ones in the last two-thirds of the mandible. *Fins*—dorsal spines of moderate strength with the interspinous membrane scarcely notched, the spines increase in length to the last, the height of which equals the length of the post-orbital portion of the head or two-fifths of the height of the body, the last rays somewhat elongated and equal to half the height of the body. Pectoral nearly as long as the head: ventral with its outer ray elongated and nearly reaching the anal spines: anal spines of equal strength, the second not so long as the third which is rather longer than the diameter of the orbit: caudal deeply forked, the upper lobe the longer, but no filamentous prolongation was observed in Madras specimens. *Colours*—reddish superiorly, becoming silvery along the sides and beneath, where yellow bands exist: a bluish spot on the opercle: fins reddish, dorsal edged with orange and having a golden band along its base.

This species is closely allied to *S. notatus*, from which it differs both in its dentition and colouring.

Habitat.—Seas of India. The specimen figured is from Madras, and 8 inches in length.

4. **Synagris Japonicus**, Plate XXIV, fig. 2.

Sparus Japonicus, Bl. t. 277, f. 1 (not *Synagris Japonicus*, Günther).
Cantharus filamentosus, Rüpp. Atl. p. 50, t. xii, f. 3 (not *Dentex filamentosus*, C. V.).
Dentex tambulus, Cuv. and Val. vi, pp. 249, 558 (? Rüppell, not Bleeker).
? *Dentex bipunctatus*, (Ehren.) Cuv. and Val. vi, p. 247.
Synagris filamentosus, Günther, Catal. i, p. 378.
Synagris grammicus, Day, Fish. Malabar, p. 26, pl. iv.
Changarah, Tam.

B. vi, D. $\frac{10}{9}$, P. 17, V. 1/5, A. $\frac{3}{7}$, C. 17, L. l. 48, L. tr. $3\frac{1}{2}$/10.

Length of head 1/4, of caudal 2/9, height of body 1/4 of the total length excluding the filamentous prolongation of the upper caudal lobe. *Eyes*—diameter $3\frac{1}{4}$ to $3\frac{1}{3}$ in length of head, $1\frac{1}{4}$ to $1\frac{1}{2}$ diameters from end of snout, and nearly 1 apart. The maxilla reaches to below the first third of the orbit. Vertical limb of preopercle finely and evenly serrated in its lower half: its angle rounded and entire. Opercle without any distinct spine. *Teeth*—in villiform bands in both jaws, from four to six small curved canines in the front of either premaxillary, whilst the outer row is a very little the largest: in the mandible the last six or eight teeth only are conical and a little enlarged. *Fins*—dorsal spines rather weak with the interspinous membrane scarcely notched, the height of the spines increase to the last which equals the length of the postorbital portion of the head; the last ray equals half the length of the head. Pectoral reaches to above the anal spines. Ventral, having its first ray prolonged, reaches as far as the anal fin. Third anal spine slightly weaker than the second but longer, equalling one-third the length of the head. Caudal deeply forked, having a filamentous prolongation. (This may be peculiar to the males, but I have reason to believe it is present in the females. In a specimen captured at Madras, $9\frac{1}{5}$ inches in length to the end of the caudal lobes, the upper one is produced beyond this $2\frac{3}{10}$ inches in addition.) *Colours*—yellowish-red, having longitudinal reddish lines along each row of scales. Dorsal and anal fins with a yellow streak along their centres, a grey base and pinkish edge.

Dentex Blochii, Bleeker (Sciæn. p. 176, and Revis. Dentex, p. 27)=*Synagris Japonicus*, Günther (Catal. i, p. 378) is not synonymous with the above, its preopercular limb being entire. The statement in Cuv. and Val. of the preopercular edge being entire is erroneous, as I have convinced myself by examining the type specimen at Berlin, and Val.'s identification of it with *Sparus Japonicus* was perfectly correct.

S. grammicus appears to be a variety of this fish, its preorbital being considerably higher than is seen in

specimens from the Red Sea and East coast of Africa, in the former the height equalling almost 1 diameter of the orbit; in the latter 1/2 or 2/3 of a diameter.

Habitat.—Red Sea, East coast of Africa, and seas of India.

5. Synagris notatus, Plate XXIV, fig. 3.

? *Dentex furcosus*, Cuv. and Val. vi, p. 244.
Synagris furcosus, Günther, Catal. i, p. 373.
Synagris notatus, Day, Pro. Zool. Soc. 1870, p. 684.

B. vi, D. $\frac{10}{9}$, P. 15, V. 1/5, A. $\frac{3}{7}$, C. 17, L. l. 47, L. tr. $3\frac{1}{2}$/10.

Length of head $3\frac{3}{4}$ to one-fourth, of caudal 2/9 to one-fifth, height of body one-fourth of the total length. *Eyes*—diameter $3\frac{1}{2}$ to 1/4 in the length of head, $1\frac{1}{2}$ diameters from the end of snout, and nearly 1 apart. Height of the head nearly equals its length. The maxilla reaches to below the front edge of the orbit. Preorbital under the commencement of the eye is nearly as high as the transverse diameter of the orbit, whilst its hind edge is more angular than in *S. Bleekeri*. Preopercle entire. Opercle with a small flat spine. *Teeth*—villiform in the upper jaw with four large curved canines in either premaxillary, and laterally an outer conical row which are not very large: villiform ones in the front third of the lower jaw with six well-developed anterior canine-like ones, laterally a row of conical teeth which become small in the last fourth of the jaw. *Fins*—dorsal spines weak, interspinous membrane very slightly emarginate, the spines increase in length to the fifth from whence they continue of about the same height or 1/3 of the length of the head to the last which is a little longer being $2\frac{3}{4}$ in the same distance: the length of the last rays equal that of the postorbital portion of the head. Pectoral equals 3/4 of the height of the body. Caudal forked, upper lobe the longer. *Colours*—rosy with a brilliant spot on the first five scales below the lateral-line, the upper half red, the lower yellow. Five or six longitudinal yellow bands are present below the lateral-line, and three silvery-white ones: fins pinkish, with a yellow band along the bases of the dorsal and anal.

This appears to be a slight variety of *S. furcosus*, Günther, in which latter the dorsal spines increase in length to the third from whence they slightly decrease to the last which equals the length of the head behind the eye.

Dentex furcosus, C. V. has an elongated body and the caudal lobes very prolonged.

Habitat.—Seas of India.

Genus, 24—PENTAPUS, *Cuv.*

Leiopsis, Bennett: *Gnathodentex*, pt. Bleeker.

Branchiostegals six: pseudobranchiæ. Body oblong. Eyes of medium size. Cleft of mouth more or less horizontal and not deep: jaws of about equal length: a serrated ridge may extend along the upper jaw. Preopercle entire: opercle without any or with a very feeble spine: preorbital narrow, entire, the distance between the eye and the mouth small. Villiform teeth in the jaws with canines, palate edentulous. One scaleless dorsal fin receivable into a groove at its base, having ten spines and from eight to ten rays: anal with three spines and from eight to ten rays: caudal forked. Scales ctenoid, of moderate or small size, with three or more rows on the preopercle. Air-vessel simple. Pyloric appendages few.

Dr. Bleeker separates *Gnathodentex* from *Pentapus* due to its possessing a serrated longitudinal ridge on the upper jaw, &c.

Geographical distribution.—Seas of India to Australia.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Pentapus aurolineatus*, D. $\frac{10}{10}$, A. $\frac{3}{9-10}$, L. l. 74-78. Golden bands along the body, a white spot on the back behind the last dorsal ray. Ceylon to the Malay Archipelago and beyond.

1. Pentapus aurolineatus.

Sparus aurolineatus, Lacép. iv, p. 132.
Dentex lycogenis, Benn. Proc. Zool. Soc. i, p. 127.
Pentapus aurolineatus, Cuv. and Val. vi, pp. 269, 559, pl. 157; Bleeker, Halma. p. 55; Günther, Catal. i, pp. 381, 507, and Fische d. Sudsee, p. 33, t. xxv, f. B.
Gnathodentex aurolineatus, Bleeker, Atl. Ich. Perc. t. xl, fig. 3, and Revis. Dentex, p. 49.

B. vi, D. $\frac{10}{10}$, P. 16, V. 1/5, A. $\frac{3}{9-10}$, C. 17, L. l. 74-78, L. tr. 6/20.

Length of head $4\frac{1}{3}$ to one-fourth, of caudal nearly one-fifth, height of body two-sevenths of the total length. *Eyes*—diameter 2/5 of length of head, 3/4 of a diameter from end of snout, and 1 apart. The maxilla reaches to below the front nostril, a serrated ridge extends along the centre of the upper two-thirds of its outer surface. *Teeth*—about six canines in the front of the upper jaw, and an equal number in front of the lower, the outer of which is enlarged. *Fins*—dorsal spines rather weak, increasing in length to the fourth which is two-fifths of the height of the body below it, the hind ones are a little shorter, the rays are rather higher than the spines, interspinous membrane slightly notched: pectoral nearly as long as the head: ventral nearly reaches the anal, the spines of the latter are not strong, the third the longest but not quite equal to the fourth of the dorsal:

caudal deeply forked. *Colours*—silvery, with four or five horizontal golden bands along the sides, and a silvery mark on the back behind the last dorsal ray: fins rosy, the dorsal, caudal, and anal being margined with red.

Habitat.—Mauritius, Ceylon to the Malay Archipelago, and beyond. This species exists in the Netley Hospital Museum, it was received from Ceylon.

Genus, 25—Smaris, *Cuv.*

Branchiostegals six: pseudobranchiæ. Body oblong or cylindrical. Eyes of medium or large size, mouth very protractile. Preopercle entire. Teeth in the jaws, none on the vomer. A single, sometimes deeply notched scaleless dorsal fin, with from nine to fifteen feeble spines; anal with three. Scales ctenoid, rather small. Air-vessel not constricted, but generally forked posteriorly. Pyloric appendages few.

Geographical distribution.—Mediterranean and Atlantic ocean, one species from Ceylon.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Smaris balteatus*, D. $\frac{15}{10}$, A. $\frac{3}{10}$. A silvery band from the eye to the tail.

1. Smaris balteatus.

Cuv. and Val. vi, p. 424; Günther, Catal. i, p. 389.

B. vi, D. $\frac{15}{10}$, P. 17, V. 1/5, A. $\frac{3}{10}$.

Length of head $4\frac{1}{4}$, of caudal $5\frac{1}{2}$, height of body one-fourth in the total length. *Eyes*—diameter $2\frac{2}{3}$ in the length of the head, 2/3 of a diameter from the end of snout. Body cylindrical and somewhat elongated: mouth protractile: the maxilla reaches to below the front edge of the orbit. *Teeth*—fine. *Fins*—division between the spinous and soft portions of the dorsal well marked. *Colours*—reddish-brown along the back, dotted with small brilliant silvery spots: the coloured part of the back streaked with the brilliant silver of the sides, whilst below this coloured portion is a wide silvery longitudinal band, which passes from the superciliary region across the opercle, and proceeds to the tail. Fins pale coloured.

Habitat.—Ceylon, to 4 inches in length.

Genus, 26—Cæsio, *(Comm.) Cuv.*

Cæsio, sp. Cuv. and Val.: *Paracæsio*, Bleeker; *Odontonectes*, Günther.

Branchiostegals six or seven: pseudobranchiæ. Body oblong, sometimes somewhat elevated. Mouth moderately protractile, its cleft oblique, lower jaw sometimes the longer. Preopercle entire or minutely serrated. Fine teeth in the jaws, sometimes deciduous ones on the vomer or palate. A single dorsal fin, more or less scaled (rarely scaleless) with the anterior portion the higher and having from nine to thirteen feeble spines: anal with three. Scales very finely ctenoid, of moderate or small size, and as a rule extended over the bases of the vertical fins. Air-vessel not constricted.*

Bleeker (Fish. Madag. p. 38) has instituted a Genus *Paracæsio* for the reception of those species in which the dorsal fin is scaleless.

Geographical distribution.—From the Red Sea, through those of India to the Malay Archipelago.

SYNOPSIS OF SPECIES.

1. *Cæsio pinjalo*, D. $\frac{11}{14}$, A. $\frac{3}{10}$, L. l. 50-55, L. tr. 9/18. Roseate and yellow: dorsal and caudal edged with black. Seas of India to the Malay Archipelago.
2. *Cæsio cuning*, D. $\frac{10}{15}$, A. $\frac{3}{11}$, L. l. 53. Bluish-green above, rosy below. Seas of India to the Malay Archipelago.
3. *Cæsio chrysozona*, D. $\frac{10}{15}$, A. $\frac{3}{11-15}$. A golden longitudinal band: a black spot in the axil and a black band along the middle of either caudal lobe. Red Sea, seas of India to the Malay Archipelago.

1. Cæsio pinjalo, Plate XXIV, fig. 4.

Pinjalo typus, Bleeker, Bydr. Topog. Batav. p. 521 and Revis. Cæsio, p. 25.

Cæsio pinjalo, Bleeker, Mænid. p. 10, Java, i, p. 102, and Atl. Ich. Perc. t. xiv, fig. 3; Günther, Catal. i, p. 391.

Mesoprion Mitchelli, Günther, Ann. and Mag. Nat. Hist. xix, 1867, p. 257, pl. ix.

B. vii, D. $\frac{11}{14}$, P. 21, V. 1/5, A. $\frac{3}{10}$, C. 17, L. l. 50-55, L. r. $7\frac{2-7}{65}5$, L. tr. 9/18.

Length of head 2/9, of caudal 1/5, height of body 2/7 of the total length. *Eyes*—diameter 2/7 to 1/4 of length of head, 3/4 to 1 diameter from end of snout, and also apart. Body oval and compressed. Lower jaw the longer. The maxilla reaches to below the front edge of the orbit. Height of preorbital equal to half the diameter of the orbit. Vertical limb of preopercle serrated, most coarsely so at its angle which is considerably produced. Opercle with a weak, flat spine. *Teeth*—villiform, with one or two, sometimes three, small conical ones on either

* Referring to *C. cærulaureus*, Dr. Günther remarks that "from the extremely delicate structure of the fin-rays, it is very difficult to count them and to give the correct numbers, but which is the more necessary, as we do not yet know to what extent they vary in the species of this genus."—Catal. i, p. 372.

side of the middle of the upper jaw, in a narrow band in a Λ-form on the vomer, and also on the palatines, occasionally absent from the latter bone, and in some specimens from the former. *Fins*—dorsal spines weak, the fourth and fifth the highest and equal to rather more than the length of the postorbital portion of the head, from thence they slightly decrease to the last which nearly equals the height of the first ray, these latter being shorter than the longest spine: pectoral slightly longer than the head, pointed, and reaching to below the first dorsal ray. Second anal spine* of equal length to, or slightly shorter than the third: caudal lunated. *Colours*—yellowish-red along the back, becoming rosy below the lateral-line: dark olivaceous stripes along the rows of scales above the lateral-line, but having a more yellow-tinge below it: pectoral, ventral, and anal orange, dorsal and caudal yellowish edged with black.

A coloured figure, eight inches long, exists in Sir Walter Elliot's collection, labelled *Motte mirrei, Cæsio?*

Habitat.—Coromandel coast of India, Malay Archipelago, attaining at least 16 inches in length. The specimen figured is 9 inches long.

2. Cæsio cuning.

Sparus cuning, Bloch, t. 263, f. 1; Lacép. iv, p. 115.

Cichla cuning, Bl. Schn. p. 336.

Cæsio erythrogaster, (Kuhl. and v. Hass.) Cuv. and Val. vi, p. 442, pl. 166; Bleeker, Verh. Bat. Gen. xxiii, Mænid. p. 9, and Atl. Ich. Perc. t. xxxiv, f. 3, and Revis. Cæsio, p. 8; Kner, Novara Fische, p. 64.

Cæsio cuning, Cuv. and Val. vi, p. 444; Günther, Catal. i, p. 390.

Odontonectes erythrogaster, Günther, Catal. i, p. 265.

B. vi, D. $\frac{10}{15}$, P. 20, A. $\frac{3}{11}$, C. 17, L. l. 53, L. tr. 7/13, Vert. 10/14, Cæc. pyl. 5.

Length of head 4/19 to 1/5, of caudal 1/4, height of body 4/15 to 2/7 of the total length. *Eyes*—diameter 1/4 of length of head, and 3/4 to 1 diameter from end of snout, and $1\frac{1}{2}$ apart. The upper maxilla reaches to slightly behind the vertical from the front edge of the orbit. Preopercular angle rounded and finely serrated. *Teeth*—villiform in jaws, small ones on vomer, and mostly some deciduous ones on the palatine bones. *Fins*—dorsal spines slender and flexible, the fourth the longest. Second and third anal spines of nearly the same height, and equal to 1/3 of the length of the head: caudal deeply forked. *Colours*—bluish-green superiorly becoming rosy along the abdomen.

Dr. Jerdon observes, "I once procured a specimen 18 inches long of this handsome fish, which the fishermen called *Cul kilchi*, Tam., but which did not appear well known to them, D. $\frac{11}{14}$, A. $\frac{3}{12}$." Madr. J. L. and Science, 1851, p. 133. The late Col. Tickell also considered he obtained it in Burma. It is very probable that it is found in the seas of India, although I have not obtained specimens from thence.

Habitat.—Seas of India to the Malay Archipelago and beyond.

3. Cæsio chrysozona, Plate XXIV, fig. 5, (var. *aurolineatus.*)

(Kuhl. and v. Hass) Cuv. and Val. vi, p. 440; Bleeker, Mænid. p. 9, and Atl. Ich. Perc. t. xxix, f. 2, and Revis. Cæsio, p. 19; Günther, Catal. i, p. 392; Kner. Novara Fische, p. 65.

Cæsio striatus, Bleeker, Batav. p. 521.

Pristipomatoides aurolineatus, Day, Proc. Zool. Soc. 1867, p. 937 (variety).

B. vi, D. $\frac{10}{14-15}$, P. 19, V. 1/5, A. $\frac{3}{11-15}$, C. 15, L. l. 72, L. tr. 8/16.

Length of head $4\frac{1}{4}$, of caudal 2/9, height of body $4\frac{1}{4}$ in the total length. *Eyes*—upper margin close to the profile, diameter $2\frac{1}{2}$ in the young to $3\frac{3}{4}$ in the adult in length of head, 3/4 of a diameter apart, 1/2 to 1 diameter from end of snout. Body rather elongated and compressed. Lower jaw the longer; the maxilla extends to below the anterior third of the orbit. Preorbital long, narrow, and at least three times as long as wide, and with elevated striæ upon it. Preopercle wide, its horizontal wider than its vertical limb; both striated at their edges, and irregularly serrated, in the adult the angle is rather produced. Opercle with a moderately developed spine. *Fins*—dorsal spines weak, third and fourth the longest, and equal to half the height of the body: interspinous membrane very slightly emarginate: rays of about equal length. Pectoral reaching to opposite the anus. First anal spine one-quarter the length of the second, which is of equal strength but slightly shorter than the third, which equals the height of the second in the dorsal fin. Caudal deeply lobed, the lower being the largest and longest. *Scales*—ctenoid, a few rows of scales along the bases of the dorsal and anal fins. *Colours*—bluish with a golden band along the lateral-line and a black one on either lobe of the caudal: a black spot in the axilla. In *C. aurolineatus.* above the lateral-line it is of a light lake colour: from the eye to the base of the caudal below the lateral-line exists a shining golden band, three scales deep anteriorly, decreasing to one posteriorly: below this band pinkish-white: caudal lobes tipped with black.

A figure nearly five inches in length exists amongst Sir W. Elliot's drawings, labelled, Nat. size, *Peroom kilché* and *Woongooni?*

The colours of *C. chrysozona*, K. v. H. given in Bleeker's Atl. Ich. Perc. xxix, fig. 2, are blue instead of a lake colour, and it has a narrow yellow band along the back close to the base of the dorsal fin, D. $\frac{10-11}{15}$, A. $\frac{3}{12}$, L. l. 65. In a fine specimen in the British Museum the height of the body is 2/9 of the total length,

* The proportionate strength of the second anal spine to that of the third, varies:—out of six specimens in my collection from 6 to 10 inches in length, in two the former is the stronger.

the first anal spine is very short, the general colour is steel blue with a golden lateral band two scales wide: the caudal lobes are of equal length.

Bleeker observes that *Cæsio chrysozona* is closely allied to *C. cærulaureus*, but the body is more elongated in the former than in the latter. The temporal band of scales is largest in the *C. cærulaureus*, which has its golden lateral band above instead of below the lateral line.

Habitat.—Red Sea, seas of India.

Eighth group—Gerrina.

Branchiostegals six. Body elevated or oblong. Preopercle serrated or entire. Mouth very protractile. Villiform teeth in the jaws. A single dorsal fin: three anal spines. Air-vessel simple.

Genus, 28—Datnioides, *Bleeker.*

Branchiostegals six: pseudobranchiæ. Body elevated. Eyes of moderate size. Premaxillaries very protractile. Preopercle serrated. Villiform teeth in the jaws without canines; vomer, palate, and tongue edentulous. A single dorsal fin having twelve stout spines: anal with three: caudal rounded. Scales ctenoid. Air-vessel simple. Pyloric appendages few.

Geographical distribution.—Mouths of large rivers from the Hooghly throughout Burma to the Malay Archipelago. Rarely found beyond tidal reach although it frequently ascends into fresh water.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Datnioides polota*, D. $\frac{12}{13-14}$, A. $\frac{3}{8-9}$, L. l. 48. Brown with several cross bands. Estuaries of the Ganges to the Malay Archipelago.

1. Datnioides polota, Plate XXIV, fig. 6.

Coius polota, Ham. Buch. pp. 95, 370, pl. 38, f. 31; Temm. and Schleg. Fauna Japon. Poiss. p. 17; Richards. Ich. Sulphur, p. 83.

Coius binotatus, Gray and Hard. Ind. Zool.; Temm. and Schel. l. c. p. 17; Richards. l. c. p. 83.

Datnia polota, Cantor, Catal. p. 16.

Lobotes hexagona, Bleeker, Nat. Tyds. Ned. Ind. i, p. 9, and ii, p. 165.

Datnioides polota, Bleeker, l. c. v, p. 441, and Atl. Ich. Perc. t. xxvii, f. 1; Günther, Catal. i, p. 339.

Nya-kya and *Nga-wet-ma*, Burm.; *Nga-pree-gryn* and *Nya-thak-how*, Arrac.

B. vi, D. $\frac{12}{13-14}$, P. 19, V. 1/5, A. $\frac{3}{8-9}$, C. 17, L. l. 48, L. r. $\frac{72}{60}$, L. tr. 12/25, Cæc. pyl. 5.

Length of head 2/7 to 1/3, of caudal 2/11 to 1/6, height of body 2/5 to 1/3 of the total length. *Eyes*—diameter 1/5 of length of head, $1\frac{1}{2}$ diameters from end of snout, and 1 apart. The posterior processes of the premaxillaries reach to behind the orbit. The maxilla extends to below the middle of the orbit. Preopercle serrated along both limbs: both shoulder-bone and the one in the axilla serrated. *Teeth*—fine in the jaws, with the outer row slightly enlarged. *Fins*—dorsal spines strong, every alternate one being thickened on one side, the fifth and sixth the longest and equal to two-fifths of the height of the body or half of the length of the head: second anal spine the strongest and longest, equalling the highest in the dorsal fin: caudal rounded. *Colours*—brownish, glossed with copper, having six or seven narrow brown vertical bands on the body and similar ones radiating from the orbit.

Habitat.—Estuaries and within tidal influence of the Ganges and rivers of Burma to the Malay Archipelago, attaining at least 1 foot in length: though not esteemed as food it is eaten by the poorer classes. The specimen figured ($6\frac{1}{4}$ inches in length) is from Calcutta.

Genus, 29—Gerres, *Cuv.*

Diapterus, Ranz.: *Chanda*, sp. Ham. Buch.: *Catochænum*, Cantor: *Synistius*, Gill: *Eucinostomus*, Baird, Gir.

Branchiostegals six: pseudobranchiæ. Body elevated or oblong, and compressed. Mouth very protractile and descending when produced. Preopercle as a rule entire, rarely serrated. Eyes comparatively large. Villiform teeth in the jaws. Inferior pharyngeal bones firmly united by a suture. Length of the bases of the spinous and soft portions of the dorsal fin of nearly equal extent, and having a scaly sheath into which it can be wholly or partially received: the spines numbering nine or ten, the rays ten or eleven: anal with three spines: caudal forked. Scales of moderate size, when ctenoid very slightly so. Air-vessel simple. Pyloric appendages few.

Gill places the Gerrini as a distinct family.

Geographical distribution.—All the tropical seas, entering estuaries. Some apparently being mostly confined to the latter situations, and ascending into brackish or fresh waters as high as tidal influence extends.

Uses.—As food these fishes are mostly eaten by the indigent classes, being little esteemed whilst fresh on account of their numerous bones and deficiency in flavour. As they salt and dry well, large numbers are extensively prepared in this manner for future use or as a matter of export trade.

The species comprising this genus are somewhat difficult of determination unless a good collection is brought together, but even then some important considerations have to be borne in mind prior to deciding whether the specimen belongs to a known or an unknown species. The eye, certainly in some, increases in

comparative size with the head as age advances, as occurs in *Megalops cyprinoides*, &c. The first few dorsal spines may be compressed or rounded: and the second and third slightly or very elongate, but this elongation often varies considerably, as seen in *G. filamentosus*, in which it may be only two-thirds the height of the body or even extending so far as the base of the caudal fin, and though this difference is generally, it is not always due to age, but in the young it is mostly shorter than in the adult. Even in the anal spines the second may be equal in length to the third or a little longer or shorter in the same species. As regards colour the young are generally vertically banded, and these bands may be indistinct or even entirely absent in the adult. In those with longitudinal bands they sometimes become interrupted in large specimens, showing rows of long oval blotches or marks placed one over the other, the reason usually being that these marks are apparent in the adult where the vertical bands existed in the immature.

SYNOPSIS OF SPECIES.

1. *Gerres setifer*, D. $\frac{10}{10}$, A. $\frac{3}{7}$, L. l 38, L. tr. 5/10. Preopercle serrated along its lower limb. Highest dorsal spine 2/5 of that of body. Silvery, a narrow dark edge to spinous dorsal, and a brown spot on the middle of each ray. Hooghly.

2. *Gerres oblongus*, D. $\frac{9}{10}$, A. $\frac{3}{7}$, L. l. 48-50. Highest dorsal spine 3/4 of that of the body. Silvery. Seas of India to the Malay Archipelago and beyond.

3. *Gerres filamentosus*, D. $\frac{9}{10}$, A. $\frac{3}{7}$, L. l. 45-48. Highest dorsal spine elongated sometimes reaching the caudal fin. Silvery, with rows of short, oblong, horizontal, bluish spots along the upper half of the body: a spot at the base or centre of each dorsal spine and ray. Seas of India to the Malay Archipelago and beyond.

4. *Gerres oyena*, D. $\frac{9}{10}$, A. $\frac{3}{7}$, L. l. 38-40, L. tr. 5/10. Highest dorsal spine as long as head excluding the snout. Red Sea, through those of India, to the Malay Archipelago and beyond.

5. *Gerres lucidus*, D. $\frac{9}{10}$, A. $\frac{3}{7}$, L. l. 41, L. tr. 5/10. Highest dorsal spine two-fifths as high as the body. Dorsal fin with a black blotch, a dark spot on each spine and ray just above the sheath. Seas of India.

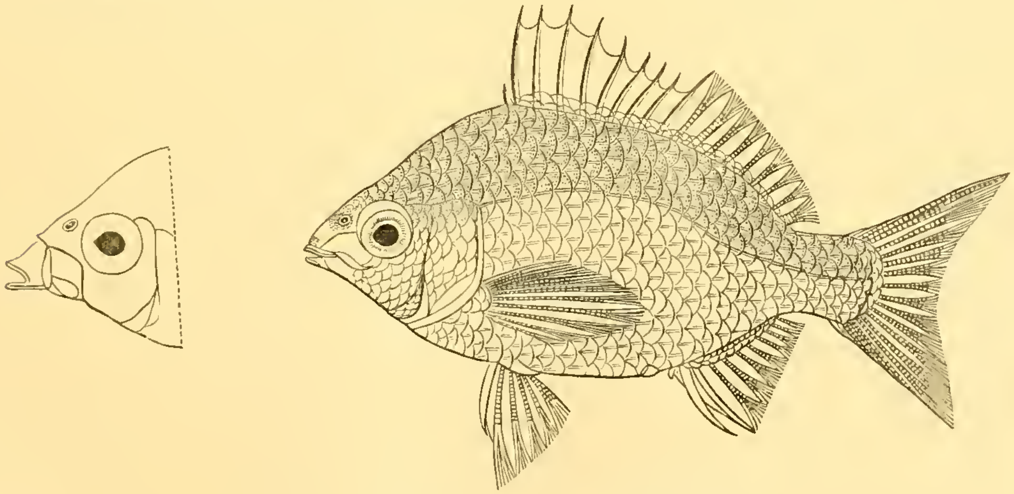
6. *Gerres abbreviatus*, D. $\frac{9}{10}$, A. $\frac{3}{7}$, L. l. 37-40, L. tr. 6/11. Highest dorsal spine almost as long as the head: pectoral long. Seas of India to the Malay Archipelago.

7. *Gerres poeti*, D. $\frac{9}{10}$, A. $\frac{3}{7}$, L. l. 40, L. tr. 6/11. Highest dorsal spine as long as the head excluding the snout. Red Sea, seas of India to the Malay Archipelago and beyond.

8. *Gerres limbatus*, D. $\frac{9}{10}$, A. $\frac{3}{7}$, L. l. 35, L. tr. 4/10. Highest dorsal spine as long as the head behind the middle of the orbit. Seas of India.

1. Gerres setifer, Plate XXV, fig. 1.

Chanda (?) *setifer*,* Ham. Buch. Fish. Ganges, pp. 105, 370.
Gerres altispinis, Günther, Catal. iv, p. 258.



Chanda (?) *setifer*, (H. Buchanan's MSS. figure).

B. vi, D. $\frac{10}{10}$, P. 17, V. 1/5, A. $\frac{3}{7}$, C. 19, L. l. 38, L. tr. 5/10.

Length of head 4/17 to 1/4, of caudal 1/5, height of body 1/3 of the total length. *Eyes*—diameter 1/3 of length of head, nearly 1 diameter from end of snout, and 1 apart. The groove for the posterior process of the premaxillary reaches to opposite the first third of the orbit, it is posteriorly rounded and scaleless. The maxilla

* Buchanan observes of his *Genus, Chanda*, or "Silvery fishes," that "the first (*Chanda setifer*) has the strongest affinity to the *Zeus insidiator*, so that all of them no doubt belong to the same genus with that fish, although I cannot help thinking that, to include them in the same genus with *Zeus ciliaris* and *Zeus faber* is an unnatural arrangement" (Buchanan l. c. p. 103), "as in the genera already described there are, as it were, certain intermediate species, so in this the two first (*Chanda setifer* and *C. ruconius*) * * * have but little of the transparency, which forms part of the generic character" (l. c. p. 104).

reaches to below the front edge of the orbit. Lower margin of preopercle serrated in its last half, in the British Museum specimen these serrations are less apparent than in mine. *Teeth*—fine. *Fins*—dorsal spines of moderate strength, the second not quite so high as the third and fourth which are equal to two-fifths the height of the body: last dorsal spine rather longer than the one preceding it, and one third shorter than the third or fourth. Pectoral reaches to nearly above the anal: ventral three-fourths of the distance to the anal: anal spines of about equal length or the second slightly the longer: caudal deeply forked. *Scales*—the sheath to the dorsal and anal fins high. Free portion of the tail as wide at its commencement as it is long. *Colours*—silvery, with a narrow dark edge to the dorsal interspinous membrane and a brown spot at the middle of each dorsal ray just above the sheath.

Hamilton Buchanan states that *Chanda setifer* has ten prickles in its dorsal fin, the first of which is very short; but irrespective of his description he has left a drawing of it, labelled *katchanda*, whilst amongst the collection of fishes received by the British Museum from Mr. Waterhouse exists one, the type of *Gerres altispinis*, Günther, having ten dorsal spines, not nine as stated in the Catalogue. It is closely allied to *G. lucidus*, but possesses one more dorsal spine, a more or less serrated border along the horizontal edge of the preopercle, and one more row of scales between the lateral-line and the base of the dorsal fin. Bleeker in his "Pisces Hindostan, &c." gives "p. 38, Scolopsides (?) setifer, Blkr. Chanda (?) setifer, Buchan."

Habitat.—River Hooghly at Calcutta, where it is common, attaining to 4 inches in length.

2. Gerres oblongus, Plate XXV, fig. 2.

Cuv. and Val. vi, p. 479; Günther, Catal. i, p. 354, and iv, p. 264.

Gerres gigas, Günther, Catal. iv, p. 262, and Fische d. Sudsee, p. 30, pl. xxiv, fig. A.

B. vi, D. $\frac{9}{10}$, P. 17, V. 1/5, A. $\frac{3}{7}$, C. 17, L. l. 48-50, L. tr. $5\frac{1}{2}$/.

Length of head 3/13, of caudal 2/9, height of body nearly 1/4 of the total length. *Eyes*—diameter 1/3 of length of head, 3/4 (in the young 1) of a diameter from end of snout, and 1 apart. Snout rather elevated. The maxilla reaches to below the front edge of the orbit. Preopercle entire. The groove for the posterior process of the premaxillary reaches to opposite the middle of the eye, it is rounded behind and scaleless. *Teeth*—fine. *Fins*—dorsal spines not very strong, compressed, the second curved and much the highest, being almost as long as the head, and three-fourths of that of the body below it: pectoral long, reaching to above the anal spines: anal spines weak, the third rather the longest and equalling the length of the post-orbital portion of the head: caudal deeply forked, with some fine scales upon it. *Scales*—$5\frac{1}{2}$ rows between the lateral-line and the base of the dorsal fin. The scaly sheath of both dorsal and anal fins moderately developed. Free portion of the tail as high at its commencement as it is long. *Colours*—silvery, eye golden. The *young* are considerably darker above the lateral-line, and show indistinct bands.

Habitat.—It would seem to extend throughout the seas of India to the Malay Archipelago and beyond. The young are sometimes captured at Madras, and I have also taken this fish at the Andaman islands, where I procured the specimen figured, which is a little over nine inches in length.

3. Gerres filamentosus, Plate XXV, fig. 3.

Zeus wodawahah, Russell, i, p. 52, pl. 67.

Gerres filamentosus, Cuv. and Val. vi, p. 482; Günther, Catal. i, p. 345, and iv, p. 261; Day, Fishes of Malabar, p. 159; Kner, Novara Fische, p. 56 (not C.V.); Klunz. Verh. z. b. Ges. Wien, 1870, p. 773.

Gerres punctatus, C. V. vi, p. 480; Bleeker, Batav. p. 521; Günther, Catal. i, p. 346, and iv, p. 260; Day, Fish. Malab. p. 159.

Catochænum filamentosum Cantor, Catal. p. 56.

Diapterus filamentosus, Bleeker, Ternate, p. 231, and Révis. Gerrini, p. 5.

Diapterus punctatus, Bleeker, Révis. Gerr. p. 9.

Jaggari, Tel. (Ganjam): *Oodan*. Tam.: *Nga-wet-sat*, Arrak.

B. vi, D. $\frac{9}{10}$, P. 15, V. 1/5, A. $\frac{3}{7}$, C. 17, L. l. 45-48, L. tr. 6/14, Cæc. pyl. 3.

Length of head 1/4 to 4/17, of caudal 2/9, height of body rather above 1/3 of the total length. *Eyes*—diameter 1/3 of length of head, 4/5 to 1 diameter from the end of snout and also apart. The maxilla extends to below the front edge or first fourth of the orbit. Preopercle entire, its angle rounded. Opercle with two blunt points. *Teeth*—fine in the jaws. *Fins*—dorsal spines of moderate strength, the second prolonged, sometimes, especially in the adult, extending to the caudal fin, in others as in the immature, it is not so high as the body: last four or five dorsal spines shorter than the rays: pectoral rather longer than the head: ventral reaching three-fourths of the way to the anal: second anal spine stronger but not quite so long as the third which equals half the length of the head: caudal deeply forked. Free portion of the tail as high at its commencement as it is long. *Scales*—the sheath along the bases of the dorsal and anal fins well developed, five or six fine rows of scales between the lateral-line and the base of the dorsal sheath. *Colours*—silvery in the adult, with rows of short oblong horizontal bluish spots along the upper half of the body, on the scales being rubbed off they are found to be continuous, forming lines: snout black: a blackish spot anteriorly on the base of each dorsal spine and ray just above the scaly sheath, and usually a dark edge to the soft dorsal: caudal greyish externally: the other fins yellow with numerous fine dots on the fin membrane.

The *young* have vertical bands, the alternate ones being the shortest.

Habitat.—Seas of India to the Malay Archipelago and beyond, attaining 8 inches or more in length.

4. Gerres oyena, Plate XXV, fig. 4.

Labrus oyena, Forsk. p. 35; Bl. Schn. p. 245; Lacép. iii, p. 463.
Labrus longirostris, Lacép. iii, p. 467, pl. 19, fig. 1.
Sparus britannus, Lacep. iv, pp. 132, 134.
Smaris oyena, Rüpp. Atl. p. 11, t. 3, f. 2.
Gerres oyena, Cuv. and Val. vi, p. 472; Bleeker, Verh. Bat. Gen. xxiii, Mænid. p. 12; Günther, Catal. i, p. 353, and iv, p. 261; Klunz. Verh. z. b. Ges. Wien, 1870, p. 772.
Gerres equula, Temm. and Schleg. Fauna Japon. p. 76, pl. 40, fig. 1.*
Diapterus filamentosus, Bleeker, Ternate, p. 232, and Révis. Gerr. p. 20.

B. vi, D. $\frac{9}{10}$, P. 15, V. 1/5, A. $\frac{3}{7}$, C. 19, L. l. 38-40, L. tr. 5/10, Cæc. pyl. 3.

Length of head 1/4, of caudal 2/9, height of body 4/11 of the total length. *Eyes*—diameter 2/7 of length of head, 1 diameter from end of snout and also apart. The groove for the posterior processes of the premaxillaries reaches to opposite the middle of the orbit. The maxilla extends to below the first third of the orbit. Preoperele roughened along its vertical limb but not serrated. *Teeth*—fine. *Fins*—dorsal spines pretty strong, the anterior ones somewhat compressed and a little arched, the second longest and equal to nearly the length of the head without the snout; the last spine nearly as high as the rays and rather longer than the postorbital length of the head: pectoral longer than the head and reaching to beyond the anal spines: ventral almost touching the anal. Second anal spine strongest but shorter than the third, which equals half the length of the head; caudal forked. *Scales*—fine ones covering the caudal fin: sheath to the dorsal and anal fins high: four rows of scales between the lateral-line and the base of the sheath opposite the fourth dorsal spine. Free portion of the tail as high at its commencement as it is long. *Colours*—silvery, dorsal fin black edged, and a dark spot on each spine and ray at about half their height: a darkish mark may exist over the free portion of the tail: a narrow black posterior edge to the middle of the caudal: the fins yellow.

Habitat.—Red Sea, East coast of Africa, seas of India to the Malay Archipelago and beyond. The specimen figured was taken at Mangalore and is $7\frac{1}{2}$ inches in length, its second anal spine is rather abnormally strong, and the lower caudal lobe is a little shortened, as is so frequently the case with littoral and estuary fishes.

5. Gerres lucidus, Plate XXV, fig. 5.

Gerres lucidus, Cuv. and Val. vi, p. 477.

B. vi, D. $\frac{9}{10}$, P. 15, V. 1/5, A. $\frac{3}{7}$, C. 17, L. l. 40, L. tr. 5/10, Cæc. pyl. 3.

Length of head 2/9, of caudal 2/9, height of body 1/3 of the total length. *Eyes*—diameter 2/5 of length of head, 2/3 of a diameter from end of snout, and 1 apart. The groove for the posterior process of the premaxillary is ovate, scaleless, and reaches to nearly opposite the first third of the orbit. The maxilla reaches to below the first third of the orbit. Preoperele entire, in a few specimens it is a little roughened along its horizontal edge, but not serrated. *Teeth*—fine. *Fins*—dorsal spines of moderate strength and not curved, the first very short, the third slightly longer than the second and equal to two-fifths of the height of the body, or the length of the head posterior to the middle of the orbit: pectoral longer than the head and reaching to above the anal spines: ventrals reach two-thirds of the way to the anal: second anal spine stronger† but generally not quite so long as the third which is a little longer than the third of the dorsal: caudal forked. Free portion of the tail as high at its commencement as it is long. *Scales*—the sheath for the dorsal fin is rather more developed than that for the anal: a few scales over the caudal: four rows between the lateral-line and the base of the fourth dorsal spine. *Colours*—silvery, with an indistinct vertical dark band over the nape, a second from below the dorsal spines, and two more below the soft portion of the dorsal fin: snout black: fins canary-yellow, the upper half of the membrane between the second and fifth dorsal spines deep black,‡ the rest of the fin dark edged with a black margin: a row of dark spots along the dorsal spines and rays at half their height: caudal grey-edged, the inferior caudal lobe with a very narrow white lower edge and a white tip.

As this fish increases in length the height of the body becomes proportionately a little less, thus at 5 inches in length it is 4/13 of the total: and the eye 3/4 of a diameter from the end of the snout.

This species is closely allied to *G. setifer*, but the latter appears to be confined to the tidal Hooghly, whereas this is a marine form having one dorsal spine less, &c., as already pointed out (see p. 98).

Habitat.—Seas of India to the Malay Archipelago and China: it is the most common Indian species, visiting the coasts in enormous numbers.

6. Gerres abbreviatus, Plate XXV, fig. 6.

? *Sparus erythrurus*, Bloch, t. 261.

* The type specimen is still in good preservation in the Leyden Museum, the artist has given his figure too elongated a shape, in fact resembling *G. oblongus*.

† The second anal spine is much stronger in this species than in specimens of *G. Japonicus*, which however it very strongly resembles.

‡ This deep black colour of the dorsal interspinous membrane, is liable to be diminished in specimens which have been kept long in spirit, especially if their condition at first had not been very good or the liquor tainted.

? *Cichla erythrura*, Bl. Schn. p. 336.

Gerres abbreviatus, Bleeker, Java, i, p. 103, and Mænid. p. 11; Günther, Catal. i, p. 345, and iv, p. 257; Kner, Novara Fische, p. 56, t. iii, f. 3a (Pharyngeal teeth).

Diapterus abbreviatus, Bleeker, Révis. Gerr. p. 16.

B. vi, D. $\frac{9}{10}$, P. 15, V. 1/5, A. $\frac{3}{7}$, C. 17, L. l. 37-40, L. tr. 6/11.

Length of head 1/4, of caudal 2/9, height of body 2/5 to 3/8 of the total length. *Eyes*—diameter 2/5 to 1/3 of length of head, 2/3 to 3/4 of a diameter from end of snout, and 1 apart. Snout somewhat spatulate: the posterior process of the premaxillary reaches to opposite the first third of the orbit. Preopercle entire or finely serrated along its vertical limb.* *Teeth*—fine. *Fins*—dorsal spines strong, the second rather longer than the third, and almost equal to the length of the head, both rather curved. Pectoral reaching to opposite the middle of the base of the anal and longer than the head: second anal spine the strongest, the third slightly the longest, equalling the distance from the posterior edge of the orbit to the end of the snout: caudal deeply forked, upper lobe slightly the longer. Free portion of the tail higher at its commencement than long. *Scales*—five rows between the lateral-line and the base of the fifth dorsal spine: sealy sheaths to dorsal and anal fins well developed. *Colours*—silvery-white, darkest along the back, each scale with a rather indistinct spot, but forming longitudinal bands: fins yellowish, dorsal with a blackish edge and a spot on each spine and ray just above the sheath.

Longest specimen obtained $7\frac{1}{10}$ inches in length.

Bloch's specimen of a *Gerres* is still in a good state of preservation in the Berlin Museum, it is about 9 inches long, and as the height of the body is $3\frac{2}{10}$ inches, it is difficult to understand how Val. could have considered it identical with *G. oyena*, having the height of the body equal to about 1/4 of the total length. It is so unlike the figure of *Sparus erythrurus* that I consider it better to leave the fish under Bleeker's name.

Habitat.—Seas of India to the Malay Archipelago.

7. Gerres poeti, Plate XXVI, fig. 1.

Cuv. and Val. vi, p. 468; Bleeker, Mænid. p. 11; Günther, Catal. i, p. 341, and iv, p. 256; Kner, Novara Fische, p. 55.

Diapterus poeti, Bleeker, Saparoua, p. 360, and Révis. Gerr. p. 18.

B. vi, D. $\frac{9}{10}$, P. 15, V. 1/5, A. $\frac{3}{7}$, C. 17, L. l. 40, L. tr. 6/11.

Length of head 2/9, of caudal 2/11, height of body 1/3 of the total length. *Eyes*—diameter 2/5 of length of head, 2/3 of a diameter from end of snout, and 1 apart. The groove for the premaxillary reaches to opposite the middle of the eye: the maxilla to below the first third of the orbit. *Teeth*—fine. *Fins*—dorsal spines not very strong, the second and third compressed and somewhat arched, the second being slightly the longer, and equal to the length of the head excluding the snout, the last spine nearly as high as the rays and equal to the postorbital portion of the head. Pectoral as long as the head and reaching to above the anal spines: the ventral extends three-fourths of the distance to the anal: second anal spine the strongest, stouter than any in the dorsal fin, and slightly longer or of the same length as the third which equals three-fourths of the height of the second of the dorsal fin: caudal forked. *Scales*—the sheath to the dorsal fin moderately developed: no scales on the caudal: five rows between the highest point of the lateral-line and the base of the dorsal fin. Free portion of the tail higher at its commencement than it is long. *Colours*—silvery, with a dark edge to the dorsal fin, and the outer edge of the caudal greyish: spots along the base of each dorsal spine and ray, and more or less distinct lines along the rows of scales on the body.

Habitat.—Red Sea, East coast of Africa, seas of India, Malay Archipelago, and beyond. My longest specimen is 7 inches.

8. Gerres limbatus.

Cuv. and Val. vi, p. 476; Günther, Catal. iv, p. 259; Day, Fishes Malabar, p. 160.

Catochænum limbatum, Cantor, Catal. p. 55.

Diapterus limbatus, Bleeker, Révis. Gerr. p. 17.

B. vi, D. $\frac{9}{10}$, P. 15, V. 1/5, A. $\frac{3}{7}$, C. 17, L. l. 35, L. tr. 4/10.

Length of head 1/4, of caudal 3/13, height of body 4/13 of the total length. *Eyes*—diameter 1/3 of length of head, 2/3 of a diameter from end of snout, and 1 apart. The maxilla reaches to below the first third of the eye. *Fins*—dorsal spines not very strong, the second and third of about equal length, compressed and somewhat arched, the third being slightly the longer and equal to the length of the head behind the middle of the orbit, the last spine nearly equal to half the height of the rays and almost as long as the postorbital portion of the head: pectoral as long as the head and reaching to nearly above the anal spines: ventral extends three-fourths of the distance to the anal: second anal spine much the strongest, also stronger than those in the dorsal fin but slightly shorter than the third which nearly equals the second of the dorsal fin: caudal deeply forked. *Scales*—the sheath of the dorsal fin moderately developed: numerous fine scales over the caudal: three rows between the summit of the lateral-line and the base of the dorsal fin. Free portion of the tail as high at its

* In a specimen from the Malabar coast, which has 40 scales along its lateral-line, the second dorsal spine is only equal to three-fourths of the length of the head, and the second of the anal is slightly shorter in proportion than in my Andamanese specimens which latter however have the spines not quite so strong. The Andamanese specimens have the angle and lower limb of the preopercle crenulated but not serrated: others from the Malay Archipelago have neither serrations nor crenulations.

commencement as it is long. *Colours*—silvery, with a dark margin to the dorsal and anal fins, and a spot on each spine and ray of the dorsal fin about its middle.

Habitat.—Seas of India. The type specimen at Paris is $4\frac{1}{2}$ inches in length, and from it the above description has been taken. I obtained a specimen 5 inches in length at Madras. It much resembles *G. lucidus* but is destitute of the dark blotch on the dorsal fin.

Genus, 30—PENTAPRION, *Bleeker.*

Clara, Gill.

This Genus differs from Gerres in having the inferior pharyngeal bones separate: 14 *to* 15 *rays in the dorsal fin:* 5 *anal spines, and* 13 *or* 14 *rays.*

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Pentaprion longimanus*, D. $\frac{9-10}{15-16}$, A. $\frac{5}{13}$.

1. Pentaprion longimanus, Plate LII, fig. 6.

Equula longimanus, Cantor, Catal. p. 152; Günther, Catal. iii, p. 505.

Pentaprion gerroides, Bleeker, Mænid. p. 13, Java, p. 104, and Révis. Pentaprion, p. 22; Günther, Catal. i, p. 396.

B. vi, D. $\frac{9-10(11)}{(14)15-16}$, P. 15, V. 1/5, A $\frac{5}{13}$, C. 17, L. l. 40.

Length of head $4\frac{1}{3}$, of caudal $4\frac{1}{3}$, height of body $3\frac{1}{4}$ in the total length. *Eyes*—diameter $2\frac{1}{3}$ in the length of head, 2/3 of a diameter from end of snout, and 1 apart. Body of a long oval shape: dorsal and anal profiles equally convex. Snout slightly swollen. The posterior process of the premaxillary reaches to opposite the first third of the eye. No spines or serrations around the orbit. The maxilla reaches to below the front edge of the eye. Mandible not concave inferiorly. Lower preopercular edge serrated. *Teeth*—villiform in the jaws, vomer and palate edentulous. *Fins*—dorsal spines weak, the first very short, the second one-third the height of the third which equals 4/7 of the length of the head. Pectoral equals the height of the body. Ventral reaches two-thirds of the distance to the anal. Second anal spine the longest and equal to 1/3 of the height of the body: caudal forked, upper lobe the longer. Free portion of tail rather higher than it is long. Scales very deciduous, they extend forwards over the back to opposite the middle of the eyes. *Colours*—silvery, with a silvery stripe from the eye to the base of the caudal fin.

Cantor erroneously gave 4 spines instead of 5 to the anal fin, in this he appears to have been copied by Dr. Günther. The specimen is much mutilated but 5 spines are still visible.

On mentioning this fish to Dr. Bleeker he at once showed me his types of *Pentaprion gerroides*, which are identical.

Habitat.—Madras, where I procured several specimens, to the Malay Archipelago. Cantor observes that "in the Straits of Malacca this species is very abundant at all seasons, and quantities, both fresh and dried, are consumed by the natives."

ADDENDA AND CORRIGENDA.

Page 18. Serranus lanceolatus.

After this portion of my work had been printed I went over to Leyden to examine the types of *S. horridus* and *S. geographicus*. *S. horridus* (K. and v. H.) Cuv. and Val. ii, p. 321 is $9\frac{1}{3}$ inches in length; *S. geographicus* (K. and v. H.) Cuv. and Val. ii, p. 322 is much larger; both are stuffed, painted and varnished, and I consider are forms of *S. lanceolatus*, Bloch, and not of *S. fuscoguttatus*, under which they are placed at p. 22.

Page 57. Apogon tæniatus.

"(Not Bleeker)" has to be omitted, and the following reference to be added:—

Apogon Noordzieki, Bleeker, Java, p. 336.

Amia Noordzieki, Bleeker, Révis. Apogonini, p. 15.

Page 59. Apogon tæniatus.

Having seen Valenciennes types I have no doubt but that they represent this species as stated by Klunzinger. One specimen still shows traces of longitudinal bands.

Page 60. Apogon Savayensis.

This fish is identical with *A. Bankanensis*, Bleeker, whose name has the priority. Dr. Bleeker showed me specimens of his fish with the markings as well seen as in Dr. Günther's specimen and figure. The following references have to be added:—

Apogon Bankanensis, Bleeker, Banda, p. 95; Günther, Catal. i, p. 238,

Amia Bankanensis, Bleeker, Bouro, p. 147, and Révis. Apogonini, p. 27.

Family, II—SQUAMIPINNES, *Cuv.*

Chætodontidæ, pt. Richardson.

Branchiostegals six or seven (Zanclus four): pseudobranchiæ well developed. Body elevated and compressed. Eyes lateral and of moderate size. Mouth generally small, with a lateral cleft, and situated in front of snout. Teeth villiform or setiform, neither incisors nor canines: in most of the genera the palate is edentulous, soft portion of the dorsal fin of greater extent than the spinous, sometimes considerably more, rarely slightly so: anal with three or four spines, its soft portion similar to that of the dorsal: lower pectoral rays branched: ventrals thoracic, with one spine and five rays. Scales cycloid, or very finely ctenoid, extending to a greater or less extent over the vertical fins, but occasionally absent from the spinous portion. Air-vessel present, generally simple. Intestines usually much convoluted; stomach cæcal. Pyloric appendages in moderate numbers.

Geographical distribution.—These fishes are, as a rule, marine, and although some have been recorded as taken in rivers and estuaries, they are rarely captured above tidal reach.

The *Squamipinnes* have been divided by Dr. Günther into three groups:—*First*, those which have the palate edentulous (*Chætodontina*): *secondly*, those which have teeth on the palate, but the dorsal fin is situated in the posterior half of the length of the back (*Toxotina*): and *thirdly*, some Australian forms wherein there are palatine teeth, and the dorsal fin occupies the middle of the length of the back, (*Scorpidina*).

In some species a prolongation of the dorsal fin, owing to sex, may be present as in *Holacanthus imperator*, *H. annularis*, &c.

SYNOPSIS OF GENERA.

First group—Chætodontina.

No palatine or vomerine teeth: no concealed spine in front of the base of the dorsal fin in the adult.

1. *Chætodon.* Snout of moderate length or short: no preopercular spine: a single un-notched dorsal fin without an elongated spine: anal with 3 or 4 spines.

2. *Chelmo.* Snout much produced: no preopercular spine: 9 to 13 dorsal spines none of which are elongated.

3. *Heniochus.* Snout of moderate length: no preopercular spine: 11 to 13 dorsal spines, the fourth being much elongated.

4. *Zanclus.* Snout of moderate length: no preopercular spine: 7 dorsal spines, the third being much elongated.

5. *Holacanthus.* Snout of moderate length: a strong preopercular spine: 11 to 15 dorsal spines, none of which are elongate.

6. *Scatophagus.* Snout of moderate length: no preopercular spine: dorsal fin notched and no scales on the spinous portion: anal with 4 spines.

7. *Ephippus.* Snout short: no preopercular spine; dorsal fin deeply notched, with 8 or 9 spines several of which are elongated and flexible.

8. *Drepane.* Snout short: no preopercular spine: dorsal fin deeply notched, with 8 or 9 spines, none of which are elongated.

Second group—Toxotina.

Vomerine and palatine teeth: no concealed spine in front of the base of the dorsal fin which is situated in the last half of the back.

9. *Toxotes.* Snout somewhat produced. Dorsal fin with 4 or 5 spines.

The young fishes in some of the above genera of the first group show considerable enlargement of the bones of the head which more or less disappear in the adult,* in a few a concealed spine pointing forwards may be present in the immature in front of the base of the dorsal fin.

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* Genus—Tholichthys, *Günther.*

Dr. Günther (Annals and Mag. of Nat. History, 1868, p. 457) described and figured a very small fish, 11 millims. long, as a new *Cyttoid* Genus, which he termed *Tholichthys*. I obtained several (I think thirteen) larger ones at Madras $1\frac{1}{10}$ inches long, which I described (Proc. Zool. Soc. 1870, p. 687,) as *T. osseus*, but drew attention to their belonging to the Family *Squamipinnes*, giving it a strong resemblance to *Heniochus* or *Chætodon*. I personally deposited my largest specimen in the British Museum, but as it has been mislaid I have figured my next largest at twice the natural size; it is unfortunately dried, all my specimens in spirit, irrespective of the one previously mentioned, having become spoiled during their transit from India.

First group—Chætodontina.

No palatine or vomerine teeth: no concealed spine in front of the base of the dorsal fin in the adult.

Genus, 1—Chætodon, *Cuv.*

Rabdophorus and *Microcanthus*, Swains.; *Megraprotodon*, Guich.; *Sarothodus*, Gill.

Branchiostegals six. Body elevated and strongly compressed. Snout of moderate length, or short. Preopercle entire, or slightly serrated, but destitute of any spine at the angle. Palate edentulous. Spinous and soft portions of the dorsal fin not separated by a notch, the rays of slightly or considerably larger number than the spines, none of the latter elongated: anal with three or four spines. Scales of large, moderate, or small size. Lateral line continuous, sometimes incomplete. Air-vessel may be constricted or with horns. Intestines much convoluted.

SYNOPSIS OF SPECIES.

A. *With four anal spines.*

1. *Chætodon plebeius.* D. $\frac{14}{13-17}$, A. $\frac{4}{15-16}$, L. l. 50. A black ocular band with white edges: a black white-edged ocellus at the base of the caudal fin. Andamans to the South Seas.

B. *With three anal spines.*

2. *Chætodon xanthocephalus.* D. $\frac{14}{27}$, A. $\frac{3}{24}$, L. l. 38. A small dark blotch above the orbit: body with five indistinct vertical streaks. Ceylon and Zanzibar.

3. *Chætodon falcula.* D. $\frac{12-13}{26-27}$, A. $\frac{3}{22-23}$, L. r. 28. A narrow ocular band, two wide triangular bands pass downwards from the dorsal fin, another exists over the free portion of the tail. Twelve or more narrow black bands on the body. Seas of India to the Malay Archipelago and beyond.

4. *Chætodon pictus.* D. $\frac{13}{25}$, A. $\frac{3}{20-22}$, L. r. $\frac{38}{33}$. An ocular band descending to the chest. Several dark lines descend downwards and forwards from the first half of the dorsal fin to the head, whilst in the last half of the body others go backwards and downwards. Dorsal and anal fins dark: caudal with a dark base and two dark vertical bands. Red Sea, seas of India, to the Malay Archipelago.

5. *Chætodon vagabundus.* D. $\frac{12-13}{23-25}$, A. $\frac{3}{20-22}$, L. r. $\frac{43}{33}$. An ocular band descending to the interopercle. Many dark bands pass downwards to the middle of the body when they go backwards. Dorsal and anal fins margined with black: two vertical black bands on caudal. From the Red Sea throughout those of India to Polynesia.

6. *Chætodon Mertensii*, D. $\frac{13}{22}$, A. $\frac{3}{16}$, L. l. 34. A narrow interrupted ocular band: anterior two-thirds of body violet, with narrow vertical, angular, bands: last third of body, soft dorsal, and anal fins yellow: a vertical band on caudal: a narrow dark intramarginal line to soft dorsal and anal fins. Red Sea, Seas of India, and beyond.

7. *Chætodon auriga.* D. $\frac{11-13}{23-24}$, A. $\frac{3}{20-21}$, L. l. 42. Fifth dorsal ray prolonged. An ocular band descends to the interopercle. A dark ocellus on the middle dorsal rays. Red Sea, through those of India to Polynesia.

8. *Chætodon Kleinii.* D. $\frac{13}{22-25}$, A. $\frac{3}{18-20}$, L. l. 33. Brownish, with a broad ocular band extending to a black ventral fin: edges of soft dorsal, caudal, and anal black. Seas of India to the Malay Archipelago.

9. *Chætodon guttatissimus*, D. $\frac{13}{22}$, A. $\frac{3}{17-18}$, L. l. 38. An ocular band descends to the interopercle: brown spots on the body scales, and small ones on the soft dorsal and anal fins: caudal with a black vertical band.

10. *Chætodon vittatus*, D. $\frac{13}{21-22}$, A. $\frac{3}{20}$, L. r. $\frac{45}{38}$. Body with numerous fine dark lines passing backwards: a dark band along the base of the dorsal fin, another along the centre of the soft dorsal: a dark band on the last third of the caudal: ventrals white. From the Red Sea to Polynesia.

11. *Chætodon unimaculatus*, D. $\frac{13}{22-23}$, A. $\frac{3}{19-20}$, L. l. 46. A narrow ocular band: a black blotch on the side above the lateral-line beneath the last four dorsal spines. Ceylon to the Malay Archipelago.

12. *Chætodon collaris*, D. $\frac{12}{26-27}$, A. $\frac{3}{20-22}$, L. l. 34. Each scale with a light centre: a whitish band from in front of the dorsal fin to the chest, another to the eye, and a third over the snout. Seas of India to the Malay Archipelago.

13. *Chætodon lunula*, D. $\frac{12}{23-26}$, A. $\frac{3}{18-20}$, L. l. 40. A wide ocular band descends to the preopercle: a second from the first dorsal spine joins it: a third goes to the base of the pectoral, and another over the free

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Tholichthys osseus, Pl. XXVI, fig. 2 (twice life size.)

Day, Proc. Zool. Soc. 1870, p. 687.

D. $\frac{12}{25}$, P. 15, V. 1/5, A. $\frac{3}{19-20}$, C. 17, L. l. 41.

Length of head nearly 1/3, of caudal 1/5, height of body 1/2 of the total length. *Eyes*—diameter from 1/2 to 2/5 of the length of head, 1/2 in diameter from the end of snout, and 1 apart. In the specimen figured the angle of the preopercle is much enlarged, reaching to almost below the origin of the pectoral fin: the shoulder scale and those over the shoulder girdle considerably dilated. *Fins*—third dorsal spine the longest and strongest, the fin notched: ventrals rounded: caudal cut almost square. *Scales*—ctenoid. *Lateral line*—ceases opposite the end of the soft dorsal fin.

This is evidently the same species as the one I formerly described, *l. c.* but the development of the cranial bones differs. Probably in *Holacanthi* the preopercular spine is the remains of the elongated and dilated preopercular angle seen in this species.

In the very young, as figured by Dr. Günther, the developments mentioned above are greatly magnified, showing that atrophy occurs as age advances.

portion of the tail. Young with a large ocellus on the soft dorsal fin. Seas of India to the Malay Archipelago.

14. *Chætodon melanotus*, D. $\frac{12}{19}$, A. $\frac{3}{18}$, L. l. 37-40. A narrow ocular band: body yellow, with its upper fourth stained with black and black lines along each row of scales: a yellow vertical band on caudal: a short black one at the base of the first four anal rays. Red Sea, seas of India, to the Malay Archipelago.

15. *Chætodon octofasciatus*, D. $\frac{11}{19-22}$, A. $\frac{3}{17}$, L. l. 50. Light vertical bands on the body and head. Seas of India to the Malay Archipelago and beyond.

16. *Chætodon oligacanthus*, D. $\frac{6-7}{29-30}$, A. $\frac{3}{19-22}$, L. l. 46-48. Five vertical brown bands: a dark ocellus at the base of the eighth to twelfth dorsal rays. Seas of India to the Malay Archipelago and beyond.

A. *With four anal spines.*

1. **Chætodon plebeius,** Plate XXVI, fig. 3.

Brouss. MS. Brit. Mus.; Gmel. Linn. p. 1269 (?); Cuv. and Val. vii, p. 68.

Chætodon plebejus, Günther, Catal. ii, p. 5, and Fische d. Sudsee, p. 35, t. xxxii, f. B.

B. vi, D. $\frac{14}{13-17}$, P. 15, V. 1/5, A. $\frac{3}{15-16}$, C. 17, L. l. 50, L. tr. 7/15.

Length of head 1/4, of caudal 1/7, height of body nearly 1/2 of the total length. *Eyes*—diameter 2/7 of length of head, and 1 diameter from end of snout. Preopercle finely serrated: the maxilla reaches half way to below the front edge of the orbit. *Fins*—dorsal spines strong, the fourth slightly the longest, the soft portions of the dorsal and anal rounded: second anal spine longest and strongest: caudal slightly rounded. *Colours*—yellow, with a black ocular band which has a white edge: a black white-edged ocellus at the base of the caudal fin.

Habitat.—Andaman islands to the South seas; the specimen figured is from the British Museum collection, and is $4\frac{1}{4}$ inches in length.

B. *With three anal spines.*

2. **Chætodon xanthocephalus,** Plate XXVI, fig. 4.

Bennett, Proc. Zool. Soc. ii, p. 182; Günther, Catal. ii, p. 33.

B. vi, D. $\frac{13-14}{25-27}$, P. 15, V. 1/5, A. $\frac{3}{24}$, C. 17, L. r. $\frac{46}{44}$, L. tr. 11/18.

Length of head $4\frac{1}{3}$, of caudal one sixth, height of body $1\frac{3}{4}$ in the total length. *Eyes*—diameter 1/4 of length of head, $1\frac{1}{2}$ diameter from end of snout, and also apart. Preopercle indistinctly serrated. *Fins*—soft portions of the dorsal and anal rounded. *Colours*—a small dark blotch above the orbit: body brownish-yellow, with six indistinct dark vertical streaks: dorsal and anal fins dark violet, having white edges: caudal and ventrals yellowish.

Habitat.—Ceylon and Zanzibar, the figure and description are from the type specimen in the British Museum.

3. **Chætodon falcula,** Plate XXVI, fig. 5.

Bloch, ix, p. 102, t. 425, f. 2; Bl. Schn. p. 225; Cuv. and Val. vii, p. 41; Bleeker, Batoe, p. 311; Günther, Catal. ii, p. 17, and Fische d. Sudsee, p. 39, t. xxvii, f. C.

Chætodon ulietensis, Cuv. and Val. vii, p. 39; Bleeker, Amboina, p. 38; Günther, Catal. ii, p. 18.

B. vi, D. $\frac{12-13}{(24)\ 26-27}$, P. 15, V. 1/5, A. $\frac{3}{22-23}$, C. 17, L. r. 28, L. tr. 6/12.

Length of head $3\frac{1}{3}$ to one fourth, of caudal $6\frac{1}{2}$, height of body $1\frac{3}{4}$ in the total length. *Eyes*—diameter 1/4 of length of head, nearly 2 diameters from the end of snout, and 1 apart. The maxilla reaches half way to below the front edge of the orbit. Preopercle serrated along its vertical limb, but almost entire along its angle and vertical edge. *Teeth*—brush-like. *Fins*—dorsal spines of moderate strength, the last being the longest, the soft portion of the fin rounded: caudal cut almost square: ventral reaching as far as the anal spines: pectoral equal to the length of the head behind the angle of the mouth: second anal spine strongest and rather the longest, being eqnal to the last of the dorsal fin. *Colours*—body and head of a rather red-lilac-purple, becoming of a primrose colour posteriorly, and also on the fins. A dark ocular band, narrower than the orbit, commences a short distance anterior to the dorsal fin, and is continued through the eye on to the interopercle, it has a white edge. A black band, widest above, arises from the first four or five dorsal spines, and is continued to a short distance below the lateral-line:* a second angularly pointed in front, begins from the last three spines and descends to the lateral-line: a third passes over a free portion of the tail. Twelve to fourteen vertical narrow black bands pass down either side. Soft dorsal fin with a narrow black upper margin: caudal with a black and white posterior edge: anal with a black intramarginal band having a white outer margin, and two more superiorly parallel to it.

Habitat.—Seas of India to the Malay Archipelago and beyond. The specimen figured was taken at the Nicobars, the species attains to at least 8 inches in length.

* A different distribution of colours is shown in Garrett's "Fische d. Sudsee," in which the body is lighter than described above. The two dark vertical bands from the dorsal fin are conjoined superiorly and only extend forwards so far as the fourth dorsal spine, but they descend lower than in my specimen. Likewise the band over the free portion of the tail is reduced to a blotch. The body bands are stated to have sometimes white edges.

4. Chætodon pictus, Plate XXVI, fig. 6.

Forsk. p. 65; Bl. Schn. p. 226; Cuv. and Val. vii, p. 55; Bleeker, Nat. Tyds. Ned. Ind. ii, p. 177; Günther, Catal. ii, p. 24; Klunz. Fische d. Roth. Meer, Verh. z. b. Ges. Wien, 1870, p. 781.

Chætodon vagabundus? Russell, Fish. Vizag. i, p. 65, pl. 83; Bennett, Fish. Ceylon, p. 7, pl. 7.

Chætodon decussatus, Cuv. and Val. vii, p. 54; Bleeker, l. c. xiii, p. 328; Kner, Nov. Fische, p. 101.

Painah, Tel.: *Khyeng-khayowk*, Arrak.

B. vi, D. $\frac{13}{25}$, P. 15, V. 1/5, A. $\frac{3}{20-22}$, C. 17, L. l. $\frac{38}{33}$, L. tr. 6/14.

Length of head above 2/7, of caudal 2/11, height of body 4/7 of the total length. *Eyes*—diameter 4/13 of the length of head, 1 diameter from the end of snout, and also apart. Preopercle finely serrated. *Teeth*—brush-like. *Fins*—dorsal spines of moderate strength, soft portions of both dorsal and anal fins angular. Pectoral as long as the head behind the anterior nostril: ventral reaches to the anal: second anal spine stronger but of equal length to the third. *Colours*—snout with a black band: a dark ocular one descends through the eye over the interopercle to the chest: numerous fine dark lines descend downwards and forwards from the first half of the dorsal fin to the middle of the body, whilst in the posterior half of the body there are others having a direction downwards and backwards. Dorsal and anal fins dark, having a black margin and a light external edge, the dark line is continued over the posterior third of the body: there is another dark line over the free portion of the tail, and a dark semilunar mark on the caudal fin. Ventral darkest in its centre.

Amongst Sir Walter Elliot's drawings exists a figure of this species marked *Kunnadee* or *Kalloodi*: a second labelled September, 1848, shows the red bands across the snout, this is the variety, No. 83, figured by Russell and identical with *C. decussatus*, C. and V.

Habitat.—Red Sea, those of India to the Malay Archipelago, attaining at least 10 inches in length. The specimen figured is life-size from one captured at the Andamans.

5. Chætodon vagabundus, Plate XXVII, fig. 1.

Chætodon vagabundus, Linn. Mus. Ad. Fried. ii, p. 71 and Sys. i, p. 465; Gmel. Linn. p. 1251; Bl. p. 1192, t. 204, f. 2; Bl. Schn. p. 222; Cuv. and Val. vii, p. 50; Bleeker, Verh. Bat. Gen. xxiii, Chætod. p. 18; Günther, Catal. ii, p. 25 and Fische d. Sudsee, p. 43.

Pah-noo-dah, Andam.

B. vi, D. $\frac{12-13}{23-25}$, P. 15, V. 1/5, A. $\frac{3}{20-22}$, C. 17, L. r. $\frac{43}{33}$, L. tr. 4/15.

Length of head about one fourth, of caudal from $6\frac{1}{2}$ to one sixth, height of body $1\frac{3}{4}$ of the total length. *Eyes*—diameter 3/10 of the length of head, $1\frac{1}{4}$ diameters from the end of snout, and also apart. Snout rather produced and pointed. The maxilla reaches to below the front nostril. Preopercle finely serrated, most strongly so at its angle. *Teeth*—brush-like. *Fins*—dorsal spines of moderate strength, the interspinous membrane deeply notched: soft portions of the dorsal and anal obtusely angular: pectoral as long as the head behind the angle of the mouth: ventral nearly reaching the anal: second anal spine equals the length of the third: caudal rounded. *Colours*—a black ocular band having white edges descends to the angle of the interopercle. Numerous dark bands pass downwards and forwards to the centre of the depth of the body, where others pass backwards. Dorsal and anal fins margined with black. Two black vertical bands on the caudal, the anterior of which is concave.

Habitat.—From the Red Sea, through those of India to Polynesia.

6. Chætodon Mertensii, Plate XXVII, fig. 2.

? *Chætodon chrysurus*, Brouss.

? *Pomacentrus chrysurus*, Cuv. and Val. v, p. 423; Günther, Catal. iv, p. 29 (not synom.)

Chætodon Mertensii, Cuv. and Val. vii, p. 47; Günther, Fische d. Sudsee, p. 45, t. 36, fig. B. (from a drawing).

B. vi, D. $\frac{13}{22}$, P. 15, V. 1/5, A. $\frac{3}{16}$, C. 17, L. r. $\frac{34}{27}$, L. tr. 5/14.

Length of head $4\frac{1}{3}$, of caudal $6\frac{1}{2}$, height of body $2\frac{1}{4}$ of the total length. *Eyes*—diameter $3\frac{1}{4}$ of the length of the head, $1\frac{1}{4}$ diameters from end of snout and also apart. The maxilla reaches to about half way below the front edge of the orbit. Preopercle entire, its angle very oblique. *Teeth*—brush-like. *Fins*—dorsal spines of moderate strength, increasing in length to the fifth, the soft portion of the fin as high as the spinous and rounded posteriorly: ventral spine strong, as long as the head excluding the snout: caudal cut nearly square: anal spines of moderate strength but long, the third rather the longest exceeding the highest of the dorsal by nearly one fourth, soft portion of the fin similar to that of the dorsal. *Colours*—head and anterior two-thirds of the body lavender, its posterior third yellow: interorbital space yellow: a narrow dark white-edged band commences a little in front of the dorsal fin, then ceases, but reappears a little above the eye, through which it descends and passes down the preopercle to a little in front of its angle. Anterior two-thirds of the body with narrow black vertical bands, which form an angle at the middle of the body directed forwards. A narrow dark intramarginal line having a white outer edge exists on both the dorsal and anal fins: a narrow dark vertical band in the last third of the caudal, followed by a rather wider yellow one, whilst externally the fin is grey.

In Garrett's "Fische d. Sudsee," the formula given is D. $\frac{13}{23}$, A. $\frac{3}{18}$, and if it is the same species the figure is not exact.

Habitat.—A specimen in the Berlin Museum is from the Red Sea. I have the species from Ceylon, and Valenciennes' fish in Paris is from the Mauritius, labelled "*Chætodon chrysurus*, v. p. 423," by Valenciennes, but does not correspond with the description of *C. chrysurus*. Some other specimens are likewise thus labelled by Valenciennes, but the locality from which they were procured is unknown.

7. Chætodon auriga, Plate XXVII, fig. 3 (var. *setifer*).

Forsk. p. 60; Bl. Schn. p. 226; Cuv. and Val. vii, p. 79; Rüpp. N. W. Fische, p. 28; Günther, Catal. ii, p. 7; Klunzing. Fische d. Roth. Meer. Verh. z. b. Ges. Wien, 1870, p. 775.

Chætodon setifer, Bloch, t. 425, f. 1; Bl. Schn. p. 225; Cuv. and Val. vii, p. 76; Guérin, Icon. Poiss. pl. 22, f. 1; Less. Voy. Coq. Zool. ii, p. 175, Poiss. pl. 29, f. 2; Richards. Ich. China, p. 246; Cuv. Règ. Anim. Ill. Poiss. pl. 38, f. 1; Jenyns, Zool. Beagle, Fish. p. 61; Günther, Catal. ii, p. 6 and Fische d. Sudsee, p. 36, t. xxvi, f. B; Kner, Novara Fische, p. 97.

Pomacentrus filamentosus, Lacép. iv, pp. 506, 511.

Chætodon sebanus, Cuv. and Val. vii, p. 74.

Chætodon auriga, var. Rüpp. N. W. Fische, p. 28.

Chætodon lunaris, Gronov. ed. Gray, p. 70.

Linophora auriga, Kaup, Arch. d. Naturg. 1860, pt. 2, pp. 137 and 156.

B. vi, D. $\frac{11-13}{23-24}$, P. 15, V. 1/5, A $\frac{3}{20-21}$, C. 17, L. r. $\frac{44}{39}$, L. tr. $3\frac{1}{2}$-$4\frac{1}{2}$/13.

Length of head 3/11 to 2/7, of caudal 1/7, height of body 4/7 to 1/2 of the total length. *Eyes*—diameter 2/7 of length of head, nearly $1\frac{1}{2}$ diameters from end of snout, and 1 apart. Snout pointed. The maxilla reaches half way to below the front edge of the orbit. Preopercle very finely serrated. *Teeth*—brush-like. *Fins*,—in the specimen figured there are only eleven dorsal spines of moderate strength, the fifth ray is produced into a short filament, soft portions of dorsal and anal angularly shaped: pectoral equals the length of the head posterior to the nostrils: third anal spine the longest: caudal slightly emarginate. *Colours*—in *C. auriga* a brown ocular band, having a white anterior edge, passes through the orbit to over the interopercle. Body with darkish lines, passing upwards and backwards in the anterior third of the body, and downwards and backwards posteriorly. A darkish band passes from the base of the soft dorsal across the free portion of the tail and to the lower half of the anal. A dark band goes through the middle of the anal fin. Dorsal, anal, and caudal edged with white. In the variety *C. setifer* the ocular band, which has white edges, widens after it has passed the orbit and extends to the interopercle. Body with narrow darkish bands passing upwards and backwards in the anterior third of the body, and downwards and backwards in the last two thirds. A dark ocellus on the centre of the middle dorsal rays. Anal with a fine black intramarginal band having a white outer edge, upper and hind margins of the anal edged with black: two fine vertical lines on the caudal fin which enclose a semilunar space.

Habitat.—From the Red Sea, through the seas of India to Polynesia. The specimen figured was captured at the Nicobars, and is $4\frac{6}{10}$ inches in length.

8. Chætodon Kleinii.

Bloch,* t. 218, f. 2; Bl. Schn. p. 225; Günther, Catal. ii, p. 22.

Chætodon virescens, Cuv. and Val. vii, p. 30; Bleeker, Verh. Bat. Gen. xxiii. Chæt. p. 18.

Chætodon flavescens, Bennett, Proc. Zool. Soc. 1831, p. 61.

B. vi, D. $\frac{13}{22-25}$, P. 15, V. 1/5, A. $\frac{3}{18-20}$, C. 17, L. l. 33, L. tr. 5/11.

Length of head $4\frac{1}{3}$, of caudal 1/6, height of body nearly 1/2 of the total length. *Eyes*—diameter 1/3 of length of head, 1 diameter from end of snout, and $1\frac{1}{4}$ apart. The maxilla reaches to below the front nostril. Preopercle entire. *Fins*—dorsal spines of moderate strength increasing in length to the fifth, the soft portion of the fin rounded and rather higher than the spinous: caudal rounded: second and third anal spines of about equal strength, their length about equal to the fifth of the dorsal. *Colours*—uniform brownish, becoming darkest posteriorly: a rather broad ocular band extends from in front of the dorsal fin, through the eye over the pre- and inter-opercles to the chest and goes to the base of the ventral fin: a black band over the snout. Ventrals black: edges of the soft dorsal, anal, and caudal black.

Habitat.—Seas of India to the Malay Archipelago.

9. Chætodon guttatissimus, Plate XXVII, fig. 4.

Bennett, Proc. Zool. Soc. ii, p. 183; Günther, Catal. ii, p. 26; ? Klunz. Verh. z. b. Ges. Wien, 1870, p. 780.

Chætodon tacheté, Liénau, Nat. Hist. Soc. Mauritius, 1839, p. 36.

B. vi, D. $\frac{13}{22}$, P. 15, V. 1/5, A. $\frac{3}{17-18}$, C. 19, L. l. 38, L. r. $\frac{42}{35}$.

Length of head 4/17, of caudal 2/11, height of body 1/2 of the total length. *Eyes*—diameter 1/3 of length of head, 1 diameter from end of snout and also apart. Preopercle serrated: the posterior extremity of the maxilla reaches nearly half way to below the orbit. *Fins*—soft portions of dorsal and anal rounded posteriorly. *Colours*—a brown white-edged ocular band one third the width of the eye passes from the nape to the lower edge of the interopercle. Body yellow, each scale having a brown spot: dorsal and anal fins with an

* Klein, MSS. iv, t. 10, f. 2, p. 255.

outer narrow black edge and a broader white outer band, followed externally by a yellow margin, the rest of the fins covered with fine dark brown spots: caudal yellow with a black vertical band.

Habitat.—Ceylon, Zanzibar, and Red Sea. The figure is taken from Bennett's type specimen.

10. Chætodon vittatus, Plate XXVII, fig. 5.

Chætodon trifasciatus, Lacép. iv, p. 498; Mungo Park, Trans. Linn. Soc. iii, p. 34.

Chætodon vittatus, Bl. Schn. p. 227; Cuv. and Val. vii, p. 34; Bleeker, Verh. Bat. Gen. xxiii, Chætod. p. 18; Beechey, Voy. Zool. p. 61, pl. 17, f. 3; Günther, Catal. ii, p. 23, and Fische d. Sudsee, p. 41; Kner, Novara Fische, p. 100; Klunz. Fische d. Roth. Meer, 1870, p. 782.

Chætodon austriacus, Rüpp. N. W. Fische, p. 30, t. 9, f. 2 (var.).

B. vi, D. $\frac{13}{21\text{-}22}$, P. 15, V. 1/5, A. $\frac{3}{(18)\ 20}$, C. 18, L. r. $\frac{45}{38}$, L. tr. 5/13.

Length of head 4/17 to 1/4, of caudal 1/6 to 1/7, height of body 2/3 to 1/2 of the total length. *Eyes*—diameter 1/3 of length of head, 1 diameter from end of snout, and $1\frac{1}{4}$ apart. Snout obtuse: the maxilla reaches nearly half way to below the front edge of the orbit: preopercle finely serrated. *Fins*—the soft portion of the dorsal, anal and also of the caudal rounded. *Colours*—a dark line passes over the snout, separated by a thin white band from the ocular one, which is half as wide as the orbit, and passes to the chest. Another dark line exists parallel to it, with an intermediate fine light one. Body with about fifteen fine dark lines passing backwards. A dark band along the base of the soft dorsal fin, becoming wider over the free portion of the tail: another band along the centre of the soft dorsal. A light yellow band along the base of the anal with a dark one above it, whilst it has a white outer edge. Fins margined with dark and edged with orange. A dark vertical band on the posterior third of the caudal. Ventrals white.

Habitat.—From the Red Sea to Polynesia.

11. Chætodon unimaculatus.

Bl. p. 1181, t. 201, f. 1; Bl. Schn. p. 221; Cuv. and Val. vii, p. 72; Bleeker, Banda, i, p. 241; Günther, Catal. ii, p. 11.

B. vi, D. $\frac{13}{22\text{-}23}$, P. 15, V. 1/5, A. $\frac{3}{19\text{-}20}$, C. 17, L. l. 46, L. tr. 8/19, Vert. 10/14.

Length of head 1/4, of caudal 1/6, height of body about 1/2 of the total length. *Eyes*—diameter $3\frac{1}{3}$ of the length of head, rather above 1 diameter from the end of snout, and $1\frac{1}{4}$ apart. Lower jaw slightly the longer: the maxilla does not quite reach to below the front edge of the orbit. Preopercle entire. *Fins*—the dorsal spines strong, increasing in length to about the seventh from whence they slightly decrease, the soft portion of the fin, also of the anal, and the caudal rounded. *Colours*—yellowish, with a narrow brownish black ocular band descending from just in front of the dorsal fin through the middle of the eye to the angle of the preopercle and on to the chest: a black blotch on the side above the lateral-line* below the last four spines and two first rays: posterior edge of soft dorsal with a narrow black band which is continued over the free portion of the tail on to the hind edge of the anal rays.

Habitat.—Ceylon, (from whence the above specimen came,) to the Malay Archipelago, attaining at least 5 inches in length.

12. Chætodon collaris, Plate XXVII, fig. 6.

Bloch, t. 216, f. 1; Gmel. Linn. p. 1263; Bl. Schn. p. 223; Cuv. and Val. vii, p. 53; Bleeker, Chætod. p. 19; Günther, Catal. ii, p. 21.

Chætodon unifasciatus, Gronov. ed. Gray, p. 69.

Chætodon prætextatus, Cantor, Catal. p. 156, pl. iii; Günther, Catal. ii, p. 22; Day, Fishes of Malabar, p. 31.

B. vi, D. $\frac{12}{26\text{-}27}$, P. 15, V. 1/5, A. $\frac{3}{20\text{-}22}$, C. 17, L. r. $\frac{43\text{-}46}{34\text{-}36}$, L. tr. 7/15.

Length of head 2/7, of caudal 2/11, height of body 3/5 in the young to 2/3 in the adult of the total length. *Eyes*—diameter 1/3 of length of head, 1 diameter from end of snout, and 5/7 apart. The maxilla reaches two-thirds of the distance to below the orbit. A few fine serrations at the angle of the preopercle. *Teeth*—brush-like. *Fins*—fifth and sixth dorsal spine the longest: second anal spine the strongest and longer than the third: caudal cut nearly square. *Colours*—brownish olive, each scale light citron colour in its centre. A bluish-white band passes from in front of the dorsal fin over the opercles and on to the throat, where it expands: a second across the preorbital and over the cheek to the throat: opposite the orbit it gives off another branch which passes to the angle of the mouth and the throat. Another similar line exists on the forehead and is lost opposite the anterior edge of the orbit. Dorsal and anal fins tinged with reddish violet, the upper fourth of the soft portion being margined with six coloured bands in the following order from without: white, black, scarlet, black, pearl white, and black: anal tipped with three rows, white, black, and scarlet. Posterior half of caudal pearly white, divided by a black band from a scarlet base. Ventrals, black.

Jerdon (M. J. L. and Science, 1849, p. 134), under the head of *Chætodon pretextatus*, Cantor, observed, "I possess a dried specimen which appears to be this species." I also obtained mine at Cochin where I found

* In Bloch's type specimen, a little more than 4 inches in length (No. 1257) the blotch is partly (about 1/3) below the lateral-line.

they were common for about a fortnight in June, after the commencement of the monsoon (Proc. Zool. Soc. 1865, p. 16).

Bloch's type is of about equal length to Cantor's ($5\frac{3}{4}$ inches), which it closely resembles. The specimen I have figured appears to be the young and proportionately much higher. The specimens of *C. collaris* in the British Museum resemble those of *C. reticulatus* at Paris.

Habitat.—Seas of India to the Malay Archipelago.

13. Chætodon lunula.

Pomacentrus lunula, Lacép. iv, pp. 507, 510. 513.

Chætodon lunula, Cuv. and Val. vii, p. 59, pl. 173; Bleeker, Gilolo, p. 57; Günther, Catal. ii, p. 25 and Fische d. Sudsee, p. 42, t. xxxiii, A, B, C, D.

Chætodon biocellatus, Cuv. and Val. vii, p. 62; Less. Voy. Duperr. Zool. Poiss. p. 176; Bleeker, Borneo, p. 403; Günther, Catal. ii, p. 9.

B. vi, D. $\frac{12}{23-26}$, P. 19, V. 1/5, A. $\frac{3}{18-20}$, C. 17, L. r. $\frac{54}{40}$, L. tr. 7/14.

Length of head 2/7 to 4/11, of caudal 1/6 to 2/13, height of body 4/7 of the total length. *Eyes*—diameter 2/7 of length of head, $1\frac{1}{4}$ diameters from end of snout, and 1 apart. Preopercle serrated. *Fins*—the soft dorsal and anal rounded, caudal slightly rounded. *Lateral-line*—ceases below the last third of the soft dorsal fin. *Colours*—ocular band of a deep chestnut colour with white edges, and rather wider than the orbit, ending on the edge of the preopercle: a second brown band passes from the five first dorsal spines and unites with the occipital one: a third band from the fifth and sixth dorsal spines gradually widens and goes as low as the base of the pectoral fin: a band along the base of the soft dorsal passes over the free portion of the tail: caudal with a dark band in its posterior third: dorsal and anal with a dark edge and white margin.

In the *young* the ocular band is edged with white, the vertical bands are badly developed, and a large black white-edged ocellus exists in the centre of the soft dorsal.

Habitat.—Seas of India, Andaman islands to the Malay Archipelago.

14. Chætodon melanotus, Plate XXVIII, fig. 1.

Bl. Schn. p. 224 (not Reinw.); Klunz. Verh. z. b. Ges. Wien, 1870, p. 777.

Chætodon dorsalis, (Reinw.) Cuv. and Val. vii, p. 70; Rüpp. Atl. p. 41, t. 9, f. 2 and N. W. Fische, p. 28; Bleeker, Banda, i, p. 240; Günther, Catal. ii, p. 28.

Chætodon marginatus, (Ehren.) Cuv. and Val. vii, p. 57.

Chætodon abhortani, Cuv. and Val. vii, p. 58.

B. vi, D. $\frac{12}{19}$, P. 15, V. 1/5, A. $\frac{3}{18}$, C. 17, L. l. 37-40, L. tr. 6/16.

Length of head 1/4, of caudal nearly 1/7, height of body 4/7 of the total length. *Eyes*—diameter 1/3 of length of head, 1 diameter from end of snout, rather more apart. The maxilla does not quite reach to below the front edge of the orbit. Preopercle very finely serrated. *Fins*—dorsal spines rather strong, increasing in length to the fifth from whence they again diminish in height: soft portion of the fin also of the anal and the caudal rounded. *Colours*—yellowish, having a narrow black ocular band descending from in front of the dorsal fin through the middle of the eye, over the preopercle, interopercle, and on to the chest. The upper fourth of the body stained with black and black lines along each row of scales, a black band over the free portion of the tail but interrupted in the middle. Fins yellow, a narrow black intramarginal band along the soft portions of the dorsal and anal fins with a white outer edge: a yellow band with a narrow black external edge down the centre of the caudal, the last third of which fin is grey. A short black band at the base of the first four anal rays.

Habitat.—Red Sea, seas of India to the Malay Archipelago and beyond, attaining at least 5 inches in length. Schneider's type still exists in Berlin, it is about $4\frac{3}{10}$ inches long.

15. Chætodon octofasciatus.

Chætodon octofasciatus, Gmel. Linn. i, p. 1262; Bloch, t. 215, f. 1; Bl. Schn. p. 223; Cuv. and Val. vii, p. 17; Bleeker, Verh. Bat. Gen. xxiii, Chætod. p. 16; Günther, Catal. ii, p. 17; Kner, Novara Fische, p. 98.

Chætodon octolineatus, Gronov. ed. Gray, p. 69.

B. vi, D. $\frac{11}{19-22}$, P. 19, V. 1/5, A. $\frac{3}{17}$, C. 18, L. l. 50, L. tr. 12/24.

Length of head 1/4, of caudal nearly 1/6, height of body 2/3 of the total length. *Eyes*—diameter 1/3 of length of head, nearly 1 diameter from end of snout and also apart. Preopercle a little rough along its edge, especially at the angle, but not serrated. *Fins*—dorsal spines strong, increasing in length to the fourth, the interspinous membrane deeply emarginate, soft portions of it and of the anal rounded: second anal spine the strongest but not quite so long as the third: caudal cut almost square. *Colours*—buff, vertically banded, with a central band along the snout to between the eyes: ocular band commences a short distance in front of the dorsal fin, and passing through the eye (which is about twice its width), it crosses the cheeks and is lost on the chest: the second goes from the third and fourth dorsal spines to behind the base of the ventral: the third from the seventh dorsal spine to before the commencement of the anal: the fourth from the two last spines to the first anal rays: the fifth from the first few dorsal rays to the anterior third of the soft anal: the sixth down the last third of the soft dorsal across the free portion of the tail (where it increases in width) to near the

posterior extremity of the soft anal: the last over the base of the caudal: soft dorsal and anal with a dark outer edge and light margin.

Amongst Sir W. Elliot's drawings is a very good representation of this species marked *C. octofasciatus*, but with no note as to where it was obtained, Jerdon however remarks (M. J. L. and Sc. 1851, p. 134) that it is rarely met with in Madras, where its Tamil designation is *Munja cooli min.*

Habitat.—Seas of India to the Malay Archipelago and beyond.

16. Chætodon oligacanthus.

Platax ocellatus, Cuv. and Val. vii, p. 299; Cantor, Catal. p. 170.

Chætodon oligacanthus, Bleeker, Verh. Bat. Gen. xxiii, Chæton. p. 16; Günther, Catal. ii, pp. 34, 516; Kner, Novara Fische, p. 102.

Parachætodon oligacanthus, Bleeker, Nov. Typi Gen. Pisc. neg. 1875, p. 5.

B. vi, D. $\frac{6-7}{29-30}$, P. 15, V. 1/5, A. $\frac{3}{19-22}$, C. 17, L. l. 46-48.

Length of head 4/15 to 1/4, of caudal 1/6, height of body 2/3 of the total length. *Eyes*—diameter 4/13 of the length of head, 1 diameter from the end of snout and also apart. Both limbs of preopercle serrated, the inferior being most coarsely so. *Fins*—anterior portions of soft dorsal and anal the highest. *Lateral-line*—ceases opposite the posterior fourth of the dorsal fin. *Colours*—yellowish white, with five vertical brown bands, the anterior four of which have black edges, the ocular one is brown and narrower than the orbit: three more similar bands pass from the back to the abdomen: at the upper part of the last is a dark ocellus at the base of the 8th to 12th dorsal rays inclusive: the fifth band is over the free portion of the tail. The posterior half of the ventrals is sometimes black.

Habitat.—Seas of India, the Malay Archipelago to the Philippine Islands.*

Genus, 2—Chelmo, *Cuv.*

Branchiostegals six or seven: pseudobranchiæ. Body elevated and compressed. Snout produced as a long round tube by the horizontal elongation of the premaxillaries and mandibles† which are laterally connected by membrane, the gape of the mouth anteriorly being small. Preopercle without any spine, it and the preorbital may be serrated. Teeth on the jaws: none on the palate. One dorsal with from nine to thirteen spines, none being elongated: anal with three. Scales of moderate or small size.

Geographical distribution.—East coast of Africa, seas of India to the Malay Archipelago and beyond.

SYNOPSIS OF SPECIES.

1. *Chelmo longirostris*, D. $\frac{11-12}{23-25}$, A. $\frac{3}{18-19}$, L. l. 70-75. Yellow, with a black triangular patch from the first dorsal spine to the snout, and extending to the opercle: a round black spot at the posterior angle of the anal fin. East coast of Africa, seas of India to the Malay Archipelago.

2. *Chelmo rostratus*, D. $\frac{9}{30-31}$, A. $\frac{3}{20-21}$, L. l. 47-50. Five orange white-edged cross bands. East coast of Africa, seas of India to the Malay Archipelago and China.

1. Chelmo longirostris.

Chætodon longirostris, Brouss. Ich. t. 7.

Chelmon longirostris, Cuv. and Val. vii, p. 89, pl. 175; Bleeker, Verh. Bat. Gen. xxiii, Chætod. p. 20.

Chelmo longirostris, Günther, Catal. ii, p. 38, and Garrett's Fische d. Sudsee, p. 48.

D. $\frac{11-12}{22-25}$, P. 15, V. 1/5, A. $\frac{3}{18-19}$, C. 18, L. l. 70-75, L. tr. 11/30.

Length of head 3/7, of caudal 1/7, height of body 2/5 of the total length. *Eyes*—diameter 2/15 of the length of head, $1\frac{1}{4}$ diameters in the postorbital portion of the head. Angle and lower edge of the preopercle serrated, some fine serratures along the upper edge of the orbit and a few along the lower edge of the preorbital. *Fins*—dorsal spines strong, the interspinous membrane very deeply emarginate, the fourth spine somewhat the longest, equalling that of the head behind the front nostril, and exceeding the length of the rays, which latter portion of the fin is rounded: pectoral equals two-thirds the height of the body: third anal spine the longest. *Colours*—yellow, with a black triangular patch extending from the base of the first dorsal spine to the snout, and its lower edge going through the eye to the opercle. Posterior edge of the dorsal with a black margin: a small round black spot at the posterior angle of the anal fin: caudal grey with a rather wide dark band over its base at and anterior to the commencement of the rays.

Habitat.—East coast of Africa, seas of India, to the Malay Archipelago and beyond.

* ADDENDA.

Chætodon ?

D. $\frac{14}{26}$, A. $\frac{3}{23}$.

"I also have a drawing and the dried skin of another species of Chætodon which I procured at Tellicherry. It has the ground colour of the body, a sort of lavender colour, line from the first dorsal down to the muzzle yellow; chin, throat and lower part of face, and a line from top of opercle to base of pectoral bright orange, membrane between the dorsal spines yellow, with a blue spot which continues in a line on to the upper portion of the soft dorsal, and also on the anal; soft dorsal green with a yellowish margin. Anal and ventral yellow. Caudal lavender, the rays purple and margined on the sides with yellow and exteriorly with orange. Lips red. D. 14-26, A. 3-23. Length 6 inches."—Jerdon, M. J. L. and S. 1851, p. 134.

† Due to this tubular elongation of the snout, these fishes are able to employ it as a blow pipe, from which they discharge globules of water at insects flying above them.

2. Chelmo rostratus, Plate XXVIII, fig. 2.

Chætodon rostratus, Linn. Mus. Ad. Fried. i, p. 61, t. 33, f. 2; Gmel. Linn. p. 1244; Bl. p. 1184, t. 202, f. i; Bl. Schn. p. 221; Shaw, Zool. iv, p. 337, pl. 47; Gronov. Sys. ed. Gray, p. 73.

Chætodon enceladus, Shaw, Nat. Misc. p. 2, pl. 67.

Chelmon rostratus, Cuv. Règ. Anim. ii, p. 190, and Illus. Poiss. pl. 40, f. i; Bennett, Life of Sir S. Raffles, p. 689; Cuv. and Val. vii, p. 87; Cantor, Catal. p. 158; Bleeker, Verh. Bat. Gen. xxiii, Chætod. p. 20.

Chelmo rostratus, Günther, Catal. ii, p. 36; Kner, Novara Fische, p. 103.

D. $\frac{9}{29-31}$, P. 16, V. 1/5, A. $\frac{3}{20-21}$, C. 17, L. l. 47-50, L. r. $\frac{54}{47}$, L. tr. 8/20 (Vert. 10/14).

Length of head nearly or quite 1/3, of caudal 2/13 to 1/7, height of body about 1/2 of the total length. *Eyes*—diameter 1/5 of length of head, $2\frac{1}{2}$ diameters from the end of snout, and nearly 1 apart. Preopercle finely serrated along both limbs: lower edge of preorbital and supra-orbital margin likewise serrated in the young. *Teeth*—brush-like. *Fins*—dorsal spines moderately strong, the soft portions of the dorsal and anal obtusely angular: caudal rounded. In the young the ventral reaches the anal rays, but not so far in larger specimens: pectoral equal in length to the head behind the front nostril. *Scales*—seven rows between lateral-line and base of sixth dorsal spine. *Colours*—head and body with five orange cross-bands edged with brown and with white outer margins: a round black white-edged spot in the middle of the soft dorsal and within the fourth cross band: a dark band round the free portion of the tail: soft dorsal, caudal and anal with blue and white edges.

Habitat.—East coast of Africa through the seas of India, the Malay Archipelago and China. The specimen figured is $4\frac{6}{10}$ inches in length.

Genus, 3—Heniochus, *Cuv. and Val.*

Taurichthys, Cuv. and Val.: *Diphreutes*, Cantor.

Branchiostegals five: pseudobranchiæ. Body elevated and strongly compressed: mouth short, or of moderate length. Preopercle finely serrated or entire. Teeth villiform, none on the palate. A single dorsal fin, with from eleven to thirteen spines, the fourth of which is elongated and filiform, anal with three. Scales ctenoid or cycloid, of moderate size, and more or less covering the vertical fins. Lateral-line continuous. Air-vessel present. Pyloric appendages few.

Geographical distribution.—Seas of India to Polynesia, &c.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Heniochus macrolepidotus*, D. $\frac{11-12}{24-25}$, A. $\frac{3}{17-18}$, L. l. 52-60. Three purplish vertical bands.

1. Heniochus macrolepidotus, Plate XXVIII, fig. 3.

Chætodon macrolepidotus, Artedi, species, p. 94; Linn. Syst. i, p. 464; Gmel. Linn. p. 1247; Bl. p. 1177, t. 200, f. 1; Lacép. iv, p. 455, pl. 11, f. 3 and pl. 12, f. 1; Bl. Schn. p. 231; Klunz. Fische d. Roth. Meer. Verh. Zool. Bot. Ges. in Wien, 1870, p. 784.

Chætodon acuminatus, Linn. Mus. Ad. Fried. t. 33, f. 3; Gmel. Linn. 1241; Bl. Schn. p. 229.

Chætodon bifasciatus, Shaw, Zool. iv, p. 342; Gronov. ed. Gray, p. 75.

Heniochus acuminatus, Cuv. and Val. vii, p. 98.

Heniochus macrolepidotus, Cuv. Règ. Anim. ii, p. 191; Cuv. and Val. vii, p. 93, pl. 176; Temm. and Schleg. Fauna Japon, p. 82, pl. 44, f. 1; Richards. Ich. China, p. 246; Bleeker, Verh. Bat. Gen. xxiii, Chætod. p. 21; Günther, Catal. ii, p. 39 and Fische d. Sudsee, p. 48, t. xxxvii; Day, Fish. Malabar, p. 23; Klunzing. Verh. z. b. Ges. Wien, 1870, p. 784.

Diphreutes macrolepidotus, Cantor, Catal. p. 159.

Purroamee, Mal.: *Chuddukun*, Tam.: *Pah-no-dah*, Andam.

B. v, D. $\frac{11-12}{24-25}$, P. 17, V. 1/5, A. $\frac{3}{17-18}$, C. 17, L. l. 52, L. r. $\frac{60}{50}$, L. tr. 9/22, Cæc. pyl. 6, Vert. 10/14.

Length of head 1/4, of caudal 1/5, height of body 2/3 of the total length. *Eyes*—diameter from 4/13 to 1/3 of length of head, $1\frac{1}{2}$ diameters from end of snout, and nearly 1 apart. A slight protuberance above each orbit but none on the neck. The maxilla reaches to half way between the snout and the front edge of the orbit. Vertical limb of preopercle finely serrated, more coarsely so at its angle: sub- and inter-opercles entire: opercle with two points. *Teeth*—villiform in the jaws. *Fins*—dorsal spines rather strong, the fourth having a filamentous prolongation reaching to the caudal fin or even beyond, the fifth is also somewhat elongated: ventral reaches the anal: the second and third anal spines of about equal length and strength: caudal cut nearly square. *Scales*—about 5 rows between the lateral-line and the base of the eighth or ninth dorsal spines. *Colours*—pearly white, with a dark purplish band over the summit of the snout, another over the eyes: a third broad one extending from the three first dorsal spines and posterior two-thirds of the opercle, passing downwards includes the whole of the ventral fin and extends backwards to the anal: the last commences at the summit of the fifth dorsal spine, passes downwards to the base of the seventh, is as wide as to the first ray, and ends in the posterior third of the anal fin. Pectoral, soft portions of dorsal, anal, and caudal fins bright yellow.

In Cuv. and Val. *a variety* figured by Bennett, Ms. wherein the colours have become transposed, the dark bands being where the light ones ordinarily are, is named *H. permutatus*, (Ed. Benn.) l. c. p. 99.

Habitat.—East coast of Africa, through the Indian Ocean and Malay Archipelago: it is said to attain 18 inches in length.

Genus, 4—ZANCLUS,* *Cuv. and Val.*

Gnathocentrum, Guich.; *Gonopterus*, (Gronov.) Gray.

Branchiostegals four: pseudobranchiæ. Body elevated and compressed. Snout of moderate length. Preopercle without any spine, it and the preorbital may be serrated. Teeth in the jaws, none on the palate. One dorsal fin with seven spines, the third of which is very elongate: anal with three. Scales small. Air-vessel present. Pyloric appendages in moderate numbers.

Geographical distribution.—Seas of India to the Malay Archipelago and beyond.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Zanclus cornutus*, D. $\frac{7}{40-41}$, A. $\frac{3}{32-34}$. Yellowish-white, with three vertical dark bands. Seas of India to the Malay Archipelago and beyond.

1. Zanclus cornutus, Plate XXVIII, fig. 4.

Chætodon cornutus, Linn. Syst. p. 461; Bl. p. 1179, t. 200, f. 2; Bl. Schn. p. 221; Lacép. iv, p. 473, pl. 2, f. 1.

Zanclus cornutus, Cuv. and Val. vii, p. 102, pl. 177; Swainson, Fish. ii, p. 212; Bleeker, Verh. Bat. Gen. xxiii, Chætod. p. 22; Günther, Catal. ii, p. 493.

Gonopterus mœrens, Gronov, ed. Gray, p. 77.

B. iv, D. $\frac{7}{40-41}$, P. 19, V. 1/5, A. $\frac{3}{32-34}$, C. 16, Cæc. pyl. 14, Vert. 9/13.

Length of head nearly 1/3, of caudal 4/17, height of body 5/7 of the total length. *Eyes*—diameter 2/7 of length of head, 1 diameter apart, and twice the length of the postorbital portion of the head. Upper edge of orbit serrated in its front half and a parallel serrated ridge just above it. *Fins*—dorsal spines very elongated and filiform, the last rays are very short: anal much the highest anteriorly: caudal emarginate. *Scales*—minute. *Colours*—yellowish-white, with three broad, dark, vertical brown bands, the anterior from the two first dorsal spines and upper profile as far forwards as the orbit, descends over the opercles and cheeks to the ventral fin: the second band commencing from the base of the fourth spine to the first ray passes downwards to the highest portion of the anal, it has a white hind edge: the last goes over the caudal fin, having a concave posterior margin and a white front edge. There is also a band over the snout: pectoral yellow.

Habitat.—Seas of India to the Malay Archipelago and beyond.

Genus, 5—HOLACANTHUS, *Lacép.*

Genicanthus, Swains.

Branchiostegals six: pseudobranchiæ. Body compressed, and as a rule much elevated. Preopercle serrated, with one or more strong spines at its angle directed backwards. No palatine teeth. A single dorsal fin with from twelve to fifteen spines: anal with three or sometimes four. Scales of moderate or small size, more or less covering the vertical fins. Air-vessel with two horns posteriorly. Pyloric appendages many.

Geographical distribution.—Throughout the seas of India and generally in those of the tropics.

SYNOPSIS OF SPECIES.

A. *Scales small.*

1. *Holacanthus imperator*, D. $\frac{14}{21-22}$, A. $\frac{3}{20-21}$. Bluish, with three narrow blue bands on the head and about nineteen narrow oblique canary coloured bands on the body; chest brownish, caudal yellow. From seas of East Africa through those of India to the Malay Archipelago.

2. *Holacanthus Nicobariensis*, D. $\frac{14}{20-21}$, A. $\frac{3}{20}$. Blue, with light vertical more or less semicircular bands on the body. Red Sea, East coast of Africa, India to the Malay Archipelago and beyond.

3. *Holacanthus annularis*, D. $\frac{13}{20-21}$, A. $\frac{3}{19-21}$. Brown, with a blue ring on the shoulder, and six or seven blue body bands radiate from the eye: caudal yellow. Seas of India to the Malay Archipelago and beyond.

B. *Scales of moderate size.*

4. *Holacanthus diacanthus*, D. $\frac{14}{19}$, A. $\frac{3}{19}$, L. r. 52. Yellowish, with eight to twelve vertical blue brown-edged bands. Seas of India to the Malay Archipelago.

5. *Holacanthus xanthurus*, D. $\frac{14}{19}$, A. $\frac{3}{18-19}$, L. l. 50. Greyish, with a light opercular band and a yellow shoulder spot. Seas of India.

6. *Holacanthus xanthometopon*, D. $\frac{14}{17}$, A. $\frac{3}{17}$, L. l. 47. Blue, with yellow black-edged spots on the cheeks a yellow interorbital band, a blue spot on each scale on the body. Andamans to the Malay Archipelago.

* This genus is included by Dr. Günther amongst the *Carangidæ*. Respecting the skeleton he observes of *Z. cornutus*, which has vertebræ 9/13, that "the anterior and posterior portions of its vertebral column are so shortened in their longitudinal diameter, that, at both extremities, one vertebra has not been developed," Catal. ii, p. 493. One of his definitions of the Family *Carangidæ* being "Vertebræ 10/14" l. c. p. 417.

A. *Scales small.*

1. Holacanthus imperator, Plate XXVIII, fig. 5.

Chætodon imperator, Bloch, p. 1164, t. 194; Gmel. Linn. p. 1255; Bl. Schn. p. 217.

Holacanthus imperator, Lacép. iv, pp. 527, 534, pl. 12, f. 3; Cuv. and Val. vii, p. 180; Bleeker, Celebes, iii, p. 758, and Act. Soc. Neder. i, Man. en Makass. p. 49; Günther, Catal. ii, p. 52, and Fische d. Sudsee, p. 53, t. xli, fig. A; Klunz. Verh. z. b. Ges. Wien, 1870, p. 787.

B. vi, D. $\frac{14}{21-22}$, P. 21, V. 1/5, A. $\frac{3}{20-21}$, C. 17.

Length of head 1/4 to 3/13, of caudal 1/7, height of body 1/2 to 4/7 of the total length. *Eyes*—diameter 1/3 to 1/4 of the length of head, $1\frac{1}{4}$ to $1\frac{1}{2}$ diameters from the end of snout, and 1 apart. Body oval, strongly compressed: snout elevated. The maxilla reaches half-way to below the front edge of the orbit. Vertical limb of preopercle rather oblique and serrated, as is also its horizontal limb; angle with a strong, smooth, curved spine, one and a quarter diameters of the orbit in length, and reaching to below the base of the pectoral fin. *Teeth*—in closely set rows, some of them with a small lobe on either side of their base. *Fins*—dorsal spines strong, gradually increasing in length, with the interspinous membrane deeply notched, its soft portion as well as that of the anal rounded. Pectoral as long as the head behind the angle of the mouth: ventral reaching to the anal: anal spines strong, the third the longest and equal to the last of the dorsal or the head excluding the snout: caudal rounded. *Scales*—small, covering the vertical fins. *Colours*—Body blue, having a greenish tinge along the back: about nineteen canary-coloured lines pass upwards to the dorsal, horizontally to the caudal, or downwards towards the anal fin. A large black descending band with a blue anterior edge, on the shoulder: chest chestnut. A light blue stripe across the snout, round the cheeks, and to the preopercular spine, which is nearly black. A brown band superiorly edged with blue crosses the eye and passes on to the preopercle. Opercle yellow, edged with blue, and the branchiostegals black. A narrow black edge to the caudal: ventral dark with orange coloured rays: pectoral blackish.

A coloured drawing nearly 8 inches in length, labelled *Kulloo koli meen* and *Holacanthus imperator*, exists amongst Sir Walter Elliot's figures of fish.

Habitat.—From the East coast of Africa through the seas of India to the Malay Archipelago.

2. Holacanthus Nicobariensis, Plate XXVIII, fig. 6 (variety *semicirculatus*).

Chætodon Nicobarcensis, Bl. Schn. p. 219, t. 50.

Holacanthus geometricus, Lacép. iv, pp. 528, 537, pl. xiii, fig. 1; Cuv. and Val. vii, p. 189.

Holacanthus striatus, Rüppell, N. W. Fische, p. 32, t. x, f. 2; Bleeker, Amb. iv, p. 414; Günther, Catal. ii, p. 53.

Holacanthus semicirculatus, Cuv. and Val. vii, p. 191, pl. 183; Bleeker, Amb. vi, p. 414 and Banka, p. 452; Voy. Coq. Zool. Poiss. p. 173, pl. xxx, fig. 3; Günther, Catal. ii, p. 53.

Holacanthus Nicobariensis, Bleeker, Amb, vi, p. 413; Günther, Catal. ii, p. 52 and Fische d. Sudsee, p. 54, t. xli, f. B.

B. vi, D. $\frac{13-14}{21}$, P. 19, V. 1/5, A. $\frac{3}{20-21}$, C. 18, L. r. $\frac{85-90}{75-80}$.

Length of head 1/4, of pectoral 1/4, height of body 1/2 to 4/9 of the total length. *Eyes*—diameter 1/3 to 2/7 of length of head, 1 diameter from end of snout, and 3/4 to 1 diameter apart. Preopercle serrated, its spine smooth reaching to opposite the posterior edge of the opercle and equal in length to 3/4 or 1 diameter of the orbit. *Teeth*—brush-like. *Fins*—dorsal spines shorter than the rays, the soft dorsal angularly-rounded in the adult: caudal rounded. *Scales*—minute, about thirteen rows between lateral-line and base of sixth dorsal spine. *Colours*—this fish shows different distributions of the same colours, some dependant on age, others not so. In the young (*H. striatus*) it is deep blue with slightly curved vertical bands, alternately white and bluish-white, the white ones being the broader. Caudal white, with or without a narrow black outer margin. In a specimen in my collection there are reticulated blue lines between the broad white band behind the eye and on one descending from the centre of the spinous dorsal. In the adult (*H. semicirculatus*) the vertical bands have a more curved direction, the convexity being forwards. In the *Nicobariensis* this is still more apparent, a white spot or short transverse band being the centre around which the body bands are curved. In both these last varieties the tail fin is coloured.

In my *H. striatus* $2\frac{4}{10}$ inches in length, the preopercular spines are bifurcated at their extremities, in a specimen in the British Museum ($1\frac{7}{10}$ inches) they are not so.

Klunzinger, Verh. z. b. Ges. Wien, 1870, p. 789, enumerates *Holacanthus striatus*, Rüpp. Blkr. &c., *H. lineatus*, Rüpp. *H. cærulescens*, Rüpp. *Chætodon asfur*, var. b. Forsk. *Holacanthus haddaja*, C.V., *Chætodon maculosus*, Forsk.=*Holacanthus maculosus*, *Holacanthus aruset*, Lacép., *Pomacanthus asfur*, Lacép. as varieties of *Chætodon asfur*, Forsk.=*Holacanthus asfur*.

Habitat.—Red Sea, East coast of Africa, seas of India to the Malay Archipelago and beyond.

3. Holacanthus annularis, Plate XXIX, fig. 1.

Chætodon annularis, Bl. t. 215, f. 2; Gmel. Linn. p. 1262; Bl. Schn. p. 219; Shaw, Zool. iv, p. 330, pl. 47.

Holacanthus annularis, Lacép. iv. pp. 526, 533; Cuv. Rég. Anim. ii, p. 192; Cuv. and Val. vii, p. 178; Cantor, Catal. p. 164; Bleeker, Verh. Bat. Gen. xxiii, Chætod. p. 26; Günther, Catal. ii, p. 42.

Chætodon sahni-tschapi, Russell, Fish. Vizag. i, p. 69, pl. 88.
Chætodon resimus, Gronov. Syst. ed. Gray, p. 71.
Nga-lyk-pya, Arrak.: *Dood-ka-mal*, Chittagong.

B. vi, D. $\frac{13}{20-21}$, P. 20, V. 1/5, A. $\frac{3}{19-21}$, C. 17.

Length of head 2/9, of caudal 1/6, height of body 4/7 of the total length. *Eyes*—diameter 2/7 of length of head, $1\frac{1}{4}$ diameters from end of snout, and also apart. Preopercle finely serrated along its vertical limb, the spine at its angle smooth and as long as the diameter of the orbit. *Teeth*—brush-like. *Fins*—dorsal spines increase in length to the last, none of the rays prolonged: the soft portion of the fin angular, in adults it is often produced, that of the anal rounded: third anal spine the longest. *Scales*—small. *Colours*—sienna, with a blue ring on the shoulder. One narrow blue interorbital band is continued behind the eye over the opercle on the hind edge of which it curves upwards towards the ring: a second across the snout passes under the eye across the opercle and joins the third on the body: six or seven arched blue bands radiate from the head and are continued along the body converging towards the soft dorsal fin: pectoral yellow, with a blue band at its base. Dorsal and anal fins dark, the six body bands are continued on to the former, where there are also some intermediate narrow blue lines, the fin with a blue upper edge: anal with three blue lines on it and a light blue margin: caudal yellow, with a narrow orange tip.

Russell observed, "the present subject bears a strong resemblance to *Chætodon annularis*, Linn., but differs principally in two circumstances; the one the setaceous elongation of the dorsal fin, resembling that of *Chætodon setifer*, Bloch; the other (less material) in the remarkable ring on the shoulder being rather square than of a circular figure."

Amongst Sir Walter Elliot's drawings is one of this fish, which was coloured from an individual captured at Waltair, March, 1853, its native names are recorded as *Jatipyna*, Tel.: *Lolla terate*, Mal. Jerdon remarks, M. J. L. and Sc. 1851, p. 134, "I only once procured this beautiful fish." The specimen figured was taken at Singapore by the late Dr. Stoliczka.

Habitat.—Seas of India to the Malay Archipelago, China, and beyond. It attains at least a foot in length. The specimen figured is 6 inches long.

B. *Scales of moderate size.*

4. Holacanthus diacanthus.

Chætodon diacanthus, (Boddært), Bl. Schn. p. 220.
Chætodon dux et *Boddærtii*, Gmel. Linn. pp. 1243, 1255.
Chætodon fasciatus, Bloch, t. 195; Gmel. Linn. 1266; Bl. Schn. p. 217.
Holacanthus dux, Lacép. iv, p. 534; Cuv. and Val. vii, p. 184; Rüpp. N. W. Fische, p. 37; Bleeker, Celebes, iii, p. 757.
Acanthopus Boddærtii, Lacép. iv, pp. 559, 560.
Holacanthus diacanthus, Günther, Catal. ii, p. 48; Klunz. Verh. z. b. Ges. Wien, 1870, p. 786.

B. vi, D. $\frac{14}{19}$, P. 19, V. 1/5, A. $\frac{3}{19}$, C. 17, L. r. 52, L. tr. 7/25.

Length of head 1/5, of caudal 1/6, height of body 3/7 of the total length. *Eyes*—diameter 2/9 of length of head, $1\frac{1}{2}$ diameters from end of snout, and also apart. Preopercle strongly serrated, its spine strong, equal in length to about 2 diameters of the orbit, and extending to below the base of the pectoral fin. *Fins*—soft dorsal and anal rounded: third anal spine longest and strongest: caudal rounded. *Colours*—yellowish, with from eight to twelve vertical blue brown-edged bands, those on the body being continued on to the vertical fins. A short one exists along the snout, two descend from the summit of the head to the eye and to a little below it: one traverses the opercle, and about eight exist on the body: caudal yellow. Anal has bluish streaks parallel to its base.

Habitat.—Seas of India to the Malay Archipelago.

5. Holacanthus xanthurus, Plate XXIX, fig. 2.

Bennett, Proc. Zool. Soc. 1832, p. 183; Günther, Catal. ii, p. 51.

B. vi, D. $\frac{14}{19}$, P. 17, V. 1/5, A. $\frac{3}{18-19}$, C. 17, L. l. 50, L. r. $^{5}\frac{0-5}{45}{}^{5}$, L. tr. 7/22.

Length of head 1/4 to 4/17, of caudal excluding its prolongation 1/6, including it 1/4, height of body 1/2 of the total length excluding caudal filament. *Eyes*—diameter 1/3 to 2/7 of the length of head, 1 diameter from the end of snout, and also apart. Body compressed: dorsal and abdominal profiles about equally convex. The maxilla reaches half way to below the orbit. Vertical limb of the preopercle serrated, and having a strong smooth spine which is equal to or rather above one diameter of the orbit in length at its angle, and reaching nearly to the base of the pectoral fin. *Teeth*—in jaws fine, pointed, with the outer row the largest. *Fins*—dorsal spines and rays almost parallel to the dorsal profile, the fourth dorsal spine slightly the longest, the last being equal to the third: soft portion of the fin slightly rounded: pectoral a little longer than the head excluding the snout: the ventrals reach the vent: third anal spine longest, strongest, and one-third longer than the longest in the dorsal fin, the soft portions of the two similar: caudal rather rounded, with its upper ray produced

into a filament.* *Scales*—strongly ctenoid, and longitudinally fluted, much smaller above than below the lateral line. *Colours*—body greyish-brown, darker along the back, and becoming black over the tail as well as on the vertical fins, head, and chest: a lightish opercular band and a small but brilliant yellow shoulder spot: dorsal and anal fins edged with yellowish-white: caudal canary colour. After death each scale seems to have a light semilunar band.

A coloured figure, nearly 6 inches in length, exists in Sir Walter Elliot's collection, termed *Kul kasa*, and *Holacanthus rabdophorus*.

Habitat.—Ceylon and Madras to 6 inches in length.

6. Holacanthus xanthometopon.

Bleeker, Sumatra, ii, p. 258; Günther, Catal. ii, p. 51.

B. vi, D. $\frac{14}{17}$, P. 17, V. 1/5, A. $\frac{3}{17}$, C. 17, L. r. 47, L. tr. 7/25.

Length of head 2/9, of caudal 2/11, height of body 4/9 of the total length. *Eyes*—diameter 1/4 of length of head, $1\frac{1}{2}$ diameters from end of snout, and also apart. Vertical limb of preopercle with widely set serrations, a strong spine at the angle of the preopercle not quite half so long as the head. *Fins*—soft dorsal and anal fins angular: caudal rounded. *Colours*—blue, cheeks and opercles with numerous golden spots externally edged with black: some fine black lines on the lips and chin: a broad yellow interorbital band: body violet, each scale with a brilliant blue spot: a yellow shoulder spot. Dorsal, caudal, and pectoral yellow, with a black spot at the base of the last seven dorsal rays, caudal with a black edge: ventral and anal white with a blue edge.

Habitat—Andamans and Malay Archipelago. A specimen, $7\frac{1}{2}$ inches in length, exists in the Calcutta Museum. A native artist attempted for a whole week to figure it but unsuccessfully.

Genus, 6—Scatophagus, *Cuv. and Val.*

Cacodoxus,† Cantor.

Branchiostegals six: pseudobranchiæ. Body much compressed and elevated, snout of moderate length. Preopercle spineless. Palate edentulous. Two dorsals, united at their bases, the first having ten or eleven spines, and anteriorly a recumbent one directed forwards; the soft dorsal covered with scales: anal with four spines. Scales very small. Air-vessel simple. Pyloric appendages rather numerous.

Geographical distribution.—East coast of Africa; Seas of India, to the Malay Archipelago and beyond.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Scatophagus argus*, D. 10 | $\frac{1}{16-17}$, A. $\frac{4}{14-16}$. Purplish, blotched all over with dark spots. Seas of India, to China and Australia.

1. Scatophagus argus, Plate XXIX, fig. 3.

Chætodon argus, Gmel. Linn. p. 1248; Bloch, p. 1191, t. 204, f. 1; Bl. Schn. p. 232; Shaw, Zool. iv, p. 332; Russell, Fish. Vizag. i, p. 61, pl. 78.

Chætodon pairatalis, Ham. Buch. Fish. Ganges, pp. 122, 372, pl. 16, f. 41.

Chætodon atromaculatus, Bennett, Fish. Ceylon, p. 18, pl. 18.

Scatophagus argus, Cuv. and Val. vii, p. 136; Richards. Ich. China, p. 245; Günther, Catal. ii, p. 58 and Ann. and Mag. Nat. Hist. 1867, p. 58; Day, Fishes of Malabar, p. 34; Kner, Novara Fische, p. 106.

Cacodoxus argus, Cantor, Catal. p. 163.

Scatophagus ornatus, Günther, Catal. ii, p. 58.

Sargus maculatus, Gronov. ed. Gray, p. 65.

Qu-ee, Sind.; *Chitsilloo* and *Eesputti*, Tel.; *Sipili*, Tam.; *Nutchar char*, Mal.; *Nga-pa-thoomg*, Arrak.; *Beeshatara*, Chittag.; *Po-ra-dah*, Andam.

B. vi, D. 10 | $\frac{1}{16-17}$, P. 20, V. 1/5, A. $\frac{4}{14-16}$, C. 16, Cæc. pyl. 18 (20).

Length of head 1/4, of caudal 2/11, height of body 1/2 of the total length. *Eyes*—diameter 2/7 of length of head, 1 diameter from end of snout, and $1\frac{1}{2}$ apart. Body somewhat quadrangular, strongly compressed, and the dorsal profile more curved than the abdominal. The maxilla reaches to about half way between the end of the snout and the front edge of the orbit. Preorbital with the last half of its lower edge finely serrated. Sometimes a few very fine teeth at the angle of the preopercle and also along its lower limb: sub- and inter-opercles entire. Opercle with a weak spine. *Teeth*—villiform in the jaws. *Fins*—dorsal spines strong, each alternate one thicker on one side, interspinous membrane deeply notched, fourth spine the highest equalling the length of the head behind the posterior nostril, anterior rays much the longest, but not quite equalling the length of the fourth spine: anal spines all about the same length, each alternate one being the stronger: caudal fan-shaped, its central rays rather the longest. *Scales*—minute, in about 110 irregular rows, and continued over the soft portions of the dorsal, anal, and caudal fins, likewise on the head and opercles; about 30 rows between the 6th dorsal spine and the lateral-line. *Colours*—purplish, becoming white on the abdomen: large round blackish or

* Having seen many specimens and all with this prolongation, I think it unlikely that such is a sexual distinction.

† Substituted for *Scatophagus*, C. V. pre-occupied by *Scatophaga*, Meigen, 1803 *(Diptera.)*

greenish spots on the body, most numerous along the back, and varying in size and tints. First dorsal brownish-blue, having a few minute spots: second dorsal yellowish, with slight brown markings between the rays.

In the *very young*, a bony ridge, ending in a spine, passes from the eye to above the opercle on to the shoulder, it is serrated along the upper edge of the orbit and the lower edge of the preorbital.

Dr. Günther, Ann. and Mag. *l. c.* considers *Scatophagus ornatus*, C.V., the young of *S. argus*, C.V.

Habitat.—Indian Ocean, to China and Australia, attaining a foot in length: it enters backwaters and rivers, but is a foul feeder,* and, so far as I have observed, is not in request as food. Hamilton Buchanan remarks of it that "when newly caught it is a fish of great beauty, easy digestion, and excellent flavour: but after death it soon becomes soft and strong tasted." Cantor states that at Pinang "it is eaten by the natives, though many reject it on account of its reputed disgusting habits." In Ceylon, where it is termed *Dewi koraleyah*, "it is generally esteemed, its flesh partaking the flavour of trout."—*Bennett, l. c.*

Genus, 7—Ephippus, *Cuv.*

Selene, Lacép.; *Ilarches*, Cantor.

Branchiostegals six: pseudobranchiæ. Body much compressed and elevated. Snout short, the upper profile parabolic. Preopercle without a spine. No teeth on the palate. Dorsal with eight or nine spines, several of which are flexible and elongated, all are receivable into a groove at their base, interspinous membrane deeply cleft, and a deep notch between the spinous and soft portions of the fin: three anal spines; pectoral short. Scales of moderate or small size, some over the soft dorsal, anal, and caudal fins. Air-vessel bifurcated anteriorly, and with two long horns posteriorly. Pyloric appendages few.

Geographical distribution.—Seas of India, to the Malay Archipelago, and beyond.

SYNOPSIS OF INDIVIDUAL SPECIES.

Ephippus orbis, D. $\frac{8-9}{19-20}$, A. $\frac{3}{15}$, L. l. 42, L. tr. 7/15. Silvery. Seas of India, to the Malay Archipelago and beyond.

1. **Ephippus orbis,** Plate XXIX, fig. 4.

Chætodon orbis, Bloch, p. 1187, t. 202, f. 2; Gmel. Linn. 1244; Lacép. iv, pp. 458, 491; Bl. Schn. p. 232; Shaw, Zool. iv, p. 339.

Ephippus orbis, Cuv. Règ. Anim. ii, p. 191; Cuv. and Val. vii, p. 127; Swainson, Fishes, ii, p. 213; Richards. Ich. China, p. 245; Günther, Catal. ii, p. 62; Day, Fish. Mal. p. 35.

Ilarches orbis, Cantor, Catal. p. 160.

Nulla torriti, Tam.: *Kol-lid-dah*, Andam.

B. vi, D. $\frac{8-9}{19-20}$, P. 19, V. 1/5, A. $\frac{3}{15}$, C. 19, L. l. 42, L. r. $\frac{45}{35}$, L. tr. 7/15, Cæc. pyl. 2-4.

Length of head 1/4 to 2/9, of caudal 1/5, height of body nearly 2/3 of the total length. *Eyes*—diameter $2\frac{1}{3}$ of the length of head, nearly 1 diameter from end of snout, and also apart. The upper profile is much elevated, rising abruptly from the snout to the first dorsal fin: the abdominal contour is much less convex. The maxilla extends to opposite the anterior margin of orbit. Preopercle narrow, finely denticulated on its vertical limb and at its angle. Sub- and inter-opercles entire, opercle ending in two obtuse points connected by a shallow emargination. *Fins*—dorsal spines moderately strong at their bases, interspinous membrane at first deeply emarginated, but not that between the last spine and the soft rays: the third, fourth and fifth spines are elongated and filiform at their extremities, especially the third. The anterior rays of the dorsal from the 3rd are somewhat the longest: the fin rounded.† Ventral having its first ray elongated. Second anal spine the strongest, equal to the seventh in the dorsal in length: anterior rays the longest. Ventral pointed. Caudal slightly produced in the centre, and somewhat emarginate above and below. *Scales*—some over the bases of the vertical fins. *Air-vessel*—thick, with one tendinous attachment on either side, having horns anteriorly and two long bifurcations posteriorly. The intestines in this species are much convoluted, and possess two, sometimes four, long pyloric appendages. May 11th, 1868, a female was taken in which the ova was well developed. *Colours*—back and head greyish-green, sides and abdomen silvery shot with pink: fin membranes diaphanous finely dotted with black, more especially in their marginal halves: rays bluish white. The young have a dark grey orbital band, another over the nape, and two over the body: the fins are edged with grey.

Habitat.—Seas of India and the Malay Archipelago, attaining at least 6 inches in length; the one figured is $5\frac{3}{4}$ inches long.

Genus, 8—Drepane, *Cuv. and Val.*

Harpochirus, Cantor; *Cryptosmilia*, Cope.

Branchiostegals, six: pseudobranchiæ. Body elevated and much compressed. Snout short. Preopercle spineless. Palate edentulous. Dorsal having anteriorly a concealed spine directed forwards, and eight or nine spinous

* Col. Tickell, MS. disputes this and asserts that he has eaten this fish taken some distance off the coast, of the most delicate flavour. My reason for believing the natives to be correct as to its love for foul feeding is that I have opened many specimens, and those taken from near inhabited localities had, as a rule, their stomachs full of ordure.

† In two specimens $2\frac{3}{10}$ and $2\frac{1}{2}$ inches in length respectively, a recumbent, anteriorly directed spine exists in front of the base of the dorsal fin.

rays, which, as well as those of the anal, are receivable into a groove at their bases: interspinous membrane deeply notched: pectoral long and falciform. Scales of moderate size. Air-vessel posteriorly prolonged into two horns. Pyloric appendages few.

Geographical distribution.—Red Sea, throughout those of India, and beyond.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Drepane punctata*, D. $\frac{8-9}{21-22}$, A. $\frac{3}{18-19}$. Silvery, with or without vertical bands and black spots.

1. Drepane punctata, Plate XXIX, fig. 5.

Chætodon punctatus, Gmel. Linn. p. 1243; Bl. Schn. p. 231; Shaw. Zool. iv, p. 365.
Chætodon longimanus, Bl. Schn. p. 229.
Chætodon falcatus, Lacép. iv, pp. 452, 470.
Chætodon latte, Russell, Fish. Vizag. i, p. 62, pl. 79.
Chætodon terla, A and B, Russell, l. c. i, pp. 63, 64, fig. 80, 81.
Ephippus punctatus et *longimanus*, Cuv. Règ. Anim. ii, 191.
Drepane punctata, Cuv. and Val. vii, p. 132, pl. 179; Swainson, ii, 213; Dampier, Voy. New Holland, ii, pl. 4; Richards. Ich. China, p. 244, and Ann. and Mag. Nat. Hist. x, 1842, p. 28; Bleeker, Verh. Bat. Gen. xxii, p. 5; Günther, Catal. ii, p. 62, and Fische d. Sudsee, p. 55; Day, Fish. Malabar, p. 36; Kner, Novara Fische, p. 107.
Drepane longimana, Cuv. and Val. vii, p. 133; Richards. l. c. p. 245; Bleeker, Verh. Bat. Gen. xxiii, Chætod. p. 23.
Harpochirus punctatus et *longimanus*, Cantor, Catal. pp. 162, 163.
Cryptosmilia luna, Cope, Trans. Am. Phil. Soc. xiii, p. 401.
Punnur, Sind.; *Shuk*, Belooch.; *Pündthee*, Mal.; *Pulli* or *Torriti*, Tam.; *Thetti*, Tel.; *Roopi-chanda*, Chittag.; *Shengna-roët*, Arrak.; *Nga-shengna*, Burm.

B. vi, D. $\frac{8-9}{21-22}$, P. 17, V. 1/5, A. $\frac{3}{18-19}$, C. 15, L. l. 50-55, L. r. $\frac{60-65}{50-55}$, L. tr. 14/33, Cæc. pyl. 2-3.

Length of head from 4/13 to 1/4, of pectoral 1/2, of caudal 1/4 to 1/5, height of body 2/3 to 3/4 of the total length. *Eyes*—diameter from 3/7 to 1/3 of the length of head, 1 to $1\frac{1}{2}$ diameters from end of snout, and 2/3 to 3/4 of a diameter apart. Dorsal profile considerably elevated, the abdominal much less curved. Mouth small, the maxilla extends to below the first third of the orbit. Preorbital high, its depth generally exceeding the diameter of the eye. Preopercle with a few serrations on its lower limb: sub- and inter-opercles entire.

In *young* specimens the upper edge of the orbit and the upper edge of the occipital process are serrated, whilst there exist about eight strong teeth along the horizontal limb of the preopercle. In a very young specimen ($1\frac{1}{2}$ inches long), in addition to the foregoing, an elevated roughened ridge passes from the upper hind edge of the orbit to the lateral-line.

Fins—dorsal spines strong, and considerable differences are perceptible, in a young individual (at $1\frac{3}{10}$ inches long), the last six are of equal height. Should there be nine dorsal spines, the fourth is the longest in the adult; if only eight then the third: this spine equals the length of head behind the middle or front edge of the eye: interspinous membrane deeply notched, and the rays longer than the spines: pectoral sometimes reaching to the base of the caudal: second anal spine the strongest and generally the longest: caudal with its central rays slightly produced. *Colours*—silvery, having a gloss of gold and tinge of purple, with or without vertical bands and black spots: edges of the fins stained with grey, and a similar band along the middle of the dorsal.

The *D. punctata* has been considered a distinct species, and it may be that such an opinion is correct.* At $4\frac{1}{2}$ inches in length is the earliest age at which I have seen distinct spots existing on the vertical body bands. Out of twelve specimens of this variety, and in which every individual is distinctly spotted, nine dorsal spines invariably exist, as given by Russell, and in Cuv. and Val. vii, pl. 179.

In *D. longimana*, the black spots are absent, and out of eleven specimens examined, eight had only eight dorsal spines, the number given by Russell, whilst the horizontal one before the dorsal fin was as a rule more apparent than in the other variety: in some of the remaining three the spots may have disappeared.

In the very young the fish are covered all over with minute dark spots giving them a grey appearance.

Jerdon observes that *D. punctata* is termed *Pooli tarate*, and *D. longimana*, *Sipu tarate*. M. J. L. and S. 1851, p. 134.

Habitat.—Red Sea, East coast of Africa, seas of India to Australia, attaining at least 15 inches in length, and in most places esteemed as food.

Genus, 9—Toxotes, *Cuv.*

Branchiostegals seven: pseudobranchiæ. Body oblong, compressed, back depressed. Eyes of moderate size. Snout rather produced; lower jaw the longer. Villiform teeth on jaws, vomer, and palatine bones. A single dorsal

* "Except the colours, no external character can be assigned to distinguish the two species, but anatomical differences have been pointed out by M. M. Cuv. and Val."—Cantor, *l. c.*

fin having four or five strong spines situated in the posterior half of the back: anal with three spines. Scales cycloid, of moderate or rather small size, some are extended to over the soft portions of the vertical fins. Air-vessel simple. Pyloric appendages in moderate numbers.

Geographical distribution.—Seas and estuaries of India, to the Malay Archipelago and Polynesia.

SYNOPSIS OF SPECIES.

1. *Toxotes microlepis*, D. $\frac{5}{13}$, A. $\frac{3}{17}$, L. l. 42. Two to four rows of large black patches or stripes along the sides, most being above the lateral-line. Estuaries and large rivers of Burma and Siam near their mouths.

2. *Toxotes chatareus*, D. $\frac{(4)-5}{12}$, A. $\frac{3}{16-17}$, L. l. 31. Five or six oblong black patches along the upper half of the head and back. Estuaries and rivers of India, Bengal and Burma to the Malay Archipelago.

3. *Toxotes jaculator*, D. $\frac{4}{11-12}$, A. $\frac{3}{15-17}$, L. l. 27. Four triangular blotches descend from the back to the lateral-line. Red Sea, seas of India to the Malay Archipelago.

1. **Toxotes microlepis**, Plate XXX, fig. 1.

Blyth, Jour. As. Soc. of Bengal, 1860, p. 142; Günther, Catal. ii, p. 68.
Nya-kya-ma, Burmese.

B. vii, D. $\frac{5}{13}$, P. 12, V. 1/5, A. $\frac{3}{17}$, C. 19, L. l. 42, L. r. $\frac{46}{43}$, L. tr. 6/14, Cæc. pyl. 8.

Length of head 3/10 to 2/7, of caudal 2/11 to 1/6, height of body 2/5 of the total length. *Eyes*—diameter 1/3 to 2/7 of length of head, 1 diameter from end of snout, and $1\frac{1}{4}$ apart. Body compressed, dorsal profile horizontal and flat. The maxilla reaches to below the centre of the orbit. Preopercle and preorbital with their lower edges finely serrated. *Teeth*—villiform in the jaws, vomer, and palate. *Fins*—the dorsal commences slightly in advance of the anal, but is in the last third of the length of the body, its posterior three spines the longest, as is also the third of the anal. *Colours*—golden, with two to four large black oblong blotches or stripes along the sides, most being above the lateral-line: dorsal blotched with black and having dark edges: anal dark: caudal yellow.

Habitat.—Burma and Siam. The specimen figured is from the Irrawaddi, and $4\frac{1}{2}$ inches in length.

2. **Toxotes chatareus**, Plate XXIX, fig. 6.

Coius chatareus,* Ham. Buch. Fish. Ganges, pp. 101, 370, pl. xiv, fig. 34.
Toxotes jaculator, Cuv. and Val. vii, p. 314 (part); Cantor, Catal. p. 176; Günther, Catal. ii, p. 67 (part).
Nga-prong-gryn, *Kodryn* and *Panlong-gryn*, Arrac.

B. vii, D. $\frac{(4)-5}{12}$, P. 13, V. 1/5, A. $\frac{3}{16-17}$, C. 17, L. l. 31, L. tr. 4-5/11-10.

Length of head $3\frac{1}{4}$ to $3\frac{1}{3}$, of caudal $5\frac{3}{4}$ to 1/6, height of body 2/5 of the total length. *Eyes*—diameter $3\frac{1}{4}$ to 1/4 of length of head, 1 to $1\frac{1}{4}$ diameters from end of snout, and $1\frac{1}{4}$ apart. The maxilla reaches to below the middle of the orbit. Preorbital and preopercle serrated along their lower edges. *Teeth*—villiform in the jaws, vomer, and palate. *Fins*—dorsal spines strong, the fourth somewhat the longest and equal to the length of the head behind the middle or front margin of the eyes. In the specimen with only four dorsal spines, the third equals the fourth as described. Anal commences slightly behind the dorsal, the third spine a little the longest and equal to 2/5 the length of the head. Pectoral as long as the head without the snout. Caudal cut nearly square. *Scales*—from 26 to 28 rows between the snout and the base of the dorsal fin: 6 rows between the lateral-line and the base of the last dorsal spine. *Colours*—silvery shot with gold, dorsal profile greenish-brown, six or seven oblong spots between the eye and the end of the base of the dorsal fin. Some black blotches on the soft dorsal: anal with its lower edge black. In the *young* the blotches are larger and darker, the ventral is black, and there is a black band along the base of the caudal.

Habitat.—Rivers and estuaries of India, Burma, and the Malay Archipelago. My largest specimen is 8 inches in length, but it attains upwards of a foot. The specimen figured is 6 inches long and from the Irrawaddi.

3. **Toxotes jaculator.**

Sciæna jaculatrix, Pallas, spic. viii, p. 41.
Scarus Schlosseri, Gm. Linn. p. 1282; Lacép. iv, pp. 5, 17; Shaw, Zool. iv, p. 398.
Labrus jaculatrix, Lacép. iii, pp. 425, 464; Shaw, l. c. p. 485, pl. 68.
Toxotes jaculator, Cuv. Règ. Anim. ii, p. 196; Cuv. and Val. vii, p. 314, pl. 192 (pt.); Swainson, ii, p. 214; Bleeker, Verh. Bat. Gen. xxiii, Chætod. p. 31; Günther, Catal. ii, p. 67 (part).

B. vii, D. $\frac{4}{11-12}$, P. 15, V. 1/5, A. $\frac{3}{15-17}$, C. 17, L. l. 27, L. tr. 4-5/10-9.

Length of head 1/3, of caudal 1/6, height of body 1/3 of the total length. *Eyes*—diameter $3\frac{1}{2}$ to 1/4 of

* I have to thank Dr. Bleeker for directing my attention to the difference between *T. chatareus* and *T. jaculator*. All my fresh water and estuary specimens have five dorsal spines, except one individual having four, and they=*chatareus*: my marine forms have only four and=*jaculator*. Valenciennes remarks on the difference seen in the spines and rays, but considers the fish varieties of one species.

length of head, 1 to $1\frac{1}{4}$ diameters from end of snout, and from $1\frac{1}{4}$ to $1\frac{1}{2}$ apart. The maxilla reaches to below the middle or last third of the orbit. Preorbital and preopercle very finely serrated along their lower edges. *Teeth*—villiform in the jaws, vomer, and palate. *Fins*—dorsal spines strong, the third the longest and equal to from $1\frac{3}{4}$ to 2/5 in the length of the head. Anal commences below the first dorsal spine, the third spine the longest and equal to from $2\frac{1}{4}$ to $3\frac{1}{4}$ in the length of the head. Pectoral as long as the head without the snout. Caudal rather emarginate. *Scales*—24 rows between the snout and base of the dorsal fin: five rows between the lateral line and base of the last dorsal spine. *Colours*—brownish shot with golden: four triangular black blotches pass downwards from the back to the lateral-line, most developed in the young. Fins dark.

Habitat.—Red Sea, seas of India, to the Malay Archipelago and beyond. The two specimens described are $3\frac{3}{4}$ and $9\frac{1}{2}$ inches in length from the Andaman islands.

RUIN OF PORTUGUESE CATHEDRAL AT COCHIN (1864.)

FAMILY, III—MULLIDÆ,* *Swainson.*

Branchiostegals four: pseudobranchiæ. Body rather elongate. Profile of head more or less parabolic. Eyes of moderate size, lateral. Mouth in front of snout, rather small, and with a lateral cleft. Two stiff barbels below the chin belonging to the hyal apparatus. Teeth feeble and variously inserted. Two dorsal fins situated at some distance asunder: the anal similar to the second dorsal: ventral with one spine and five rays. Scales large, feebly ctenoid, and rather deciduous. Air-vessel, when present, simple. Pyloric appendages few or in moderate numbers.

Geographical distribution.—Seas of temperate parts of Europe and those of most of the tropics, many young and some adults have been captured in rivers.

Uses.—Usually excellent as food. We are informed that they were originally termed *Mullus* by the Romans, with reference to the scarlet colour of the sandals that their Consuls wore, and which were subsequently adopted by their Emperors under the designation of *Mulleus*. These fish kept in vivaria did not increase in size. The liver was considered the most delicate portion of the Red Mullets, which are now frequently termed the "Woodcock of the seas," due, it is asserted, to the fact that they are dressed similarly to those birds.

SYNOPSIS OF GENERA.

1. *Upeneoides.*—Teeth in both jaws, on the vomer, and palatine bones. Red Sea, East coast of Africa, seas of India, to the Malay Archipelago and beyond.
2. *Mulloides.*—Teeth in several rows in both jaws, palate edentulous. From the Red Sea and East coast of Africa, through the seas of India, to the Malay Archipelago and beyond.
3. *Upeneus.*—Teeth in a single row in both jaws, palate edentulous. From the Red Sea and East coast of Africa, through the seas of India, to the Malay Archipelago and beyond.
4. *Upeneichthys.*—Teeth in both jaws and on the vomer, none on the palatines. Australian seas.
5. *Mullus.*—Teeth in the lower jaw, none in the upper: present on the vomer and palatines. Mediterranean and temperate parts of Europe.

Amongst these fishes a minute first spine to the dorsal fin appears to be sometimes wanting; in other instances, where it is of a larger size, it seems rarely to be absent. There are likewise several other points that should not be overlooked. The comparative length of the barbels appears liable to increase with age; sometimes a sharp spine exists at the shoulder in the young, mostly disappearing as the adult stage is arrived at, although in such it may remain or even be present on one side and absent on the other, as a rule it atrophies into a blunt point. The preorbital may be scaled or scaleless.

In the "Fishes of Zanzibar," 1866, Messrs. Günther and Playfair reunited all the genera into that of *Mullus* (p. 40). Dr. Günther observed in the "Zoological Record" for 1865, p. 183: "The Recorder regrets to have formerly adopted the genera proposed in this family by Bleeker * * the Recorder regards the *Mullidæ* as one natural genus." However, in Garrett's "Fische d. Sudsee," 1874, Dr. Günther still retains Bleeker's genera, and they appear to have been generally adopted by other Ichthyologists as based on distinct anatomical characters. Still it does not seem superfluous to suggest that specimens of the genus *Upeneoides* may be taken in the Indian seas with a more or less edentulous vomer and palate.

Dr. Bleeker however changes his nomenclature in revising this family in 1874, considering the genus he formerly termed as *Upeneoides* = *Upeneus*, Cuv. and Val. thus cancelling *Upeneoides*: *Mulloides* he retains, but includes all his other fish of this family under the generic term *Parupeneus*, chiefly characterised by a single row of conical teeth in both jaws; vomer, and palate edentulous. Scales along the median line of the abdomen, having an obtuse keel. Dorsal and anal fins scaleless.

Genus, 1—UPENEOIDES, *Bleeker.*

Megalepis, Bianc.; *Upeneus*, sp. Cuv.; *Upeneus*, (C. V.) Bleeker, 1874.

Definition as in the family, except:—teeth fine in the jaws, vomer, and palatine bones.

Geographical distribution.—From the Red Sea and East coast of Africa through the seas of India, to the Malay Archipelago and beyond.

SYNOPSIS OF SPECIES.

1. *Upeneoides vittatus*, D. 8 | $\frac{1}{8}$, A. 7, L. l. 38-39. Air-vessel present. Body, dorsal and caudal fins striped. Red Sea, through those of India to the Malay Archipelago and beyond.
2. *Upeneoides sulphureus*, D. 8 | $\frac{1}{8}$, A. 7, L. l. 36-38. No air-vessel. A golden stripe from the orbit to the upper third of the tail: dorsal banded. Seas of India to the Malay Archipelago.

* In Cuv. and Val. iii, p. 419, it is remarked "Ce genre est tellément isolé, que l'on peut le considérer comme formant à lui seul une famille particulière."

3. *Upeneoides cœruleus*, D. 7-8 | 9, A. 7, L. l. 32-34. Air-vessel present. Leaden colour, bands on dorsals and caudal. Madras.

4. *Upeneoides tragula*, D. 7-8 | $\frac{1}{8}$, A. 7, L. l. 30-32. Head and body with brown spots: a brown stripe from eye to the base of the caudal: dorsal and caudal barred. East coast of Africa, seas of India to the Malay Archipelago.

5. *Upeneoides bensasi*, D. 7 | $\frac{1}{8}$, A. $\frac{1}{7}$, L. l. 30-32. Air-vessel absent. A silvery stripe from the eye to the caudal fin, body with red spots: dorsal and upper lobe of caudal barred. Madras to the Malay Archipelago.

6. *Upeneoides tæniopterus*, D. 7 | $\frac{1}{7}$, A. 7. Air-vessel present. A large triangular reddish blotch on the free portion of the tail: dorsal and caudal banded. Ceylon.

1. Upeneoides vittatus, Plate XXX, fig. 2.

Mullus vittatus, Forsk. Fauna Arab. p. 31; Gmel. Linn. p. 1341; Lacép. iii, pp. 382, 401, pl. 14, fig. 1; Bl. Schn. p. 79; Shaw, Zool. iv, p. 616, t. 89.

Mullus surmuletus, Russell, ii, p. 43, fig. 158 (*Bandi goolivinda*).

Mullus subvittatus, Schleg. Fauna Japon. Poiss. p. 30.

Upeneus vittatus, Cuv. and Val. iii, p. 448; Rüppell, N. W. Fische, p. 101; Bleeker, Révis. Mull. p. 6.

Upeneus bitæniatus, Bennett. Proc. Zool. Soc. 1830-31, p. 59.

Upeneoides vittatus, Bleeker, Amb. p. 42; Günther, Catal. i, p. 397; Day, Fish. Malabar, p. 27; Kner, Novara Fische, p. 67; Klunz. Verh. z. b. Ges. Wien, 1870, p. 742.

Cheerul, Mal.: *Chah-ti-ing-ud-dah*, Andam.

B. iv, D. 8 | $\frac{1}{8}$, P. 15-17, V. 1/5, A. $\frac{1}{7}$, C. 15, L. l. 38-39, L. tr. $2\frac{1}{2}$-3/7, Cæc. pyl. 11, Vert. 7/17.

Length of head 4/17, of caudal 1/5, height of body 4/17 to 2/9 of the total length. *Eyes*—diameter $3\frac{1}{4}$ to $3\frac{3}{4}$ of length of head, $1\frac{1}{3}$ diameters from end of snout, and 1 apart. Interorbital space nearly flat. The maxilla reaches to below the first third of the orbit. Barbels to below the angle of the preopercle or even beyond. *Teeth*—in several villiform rows in both jaws and palatines, and in a single one on the vomer. *Fins*—spines of first dorsal weak, its first one minute, the second and third of nearly the same length, and equal to two-thirds of the height of the body, and 1/3 higher than the second dorsal: six rows of scales between the two dorsal fins; origin of anal below the third or fourth dorsal ray, its spine minute: ventrals reach rather above half-way to the anus: caudal somewhat deeply forked. *Scales*—ctenoid, extending over the head to the snout, none on the preorbital bone: two rows between lateral-line and first dorsal fin, and three between it and the second: those along the median line of the abdomen with a dull keel along their centres. *Lateral-line*—in an arborescent form on each scale, especially anteriorly. *Air-vessel*—present. *Colours*—chestnut on the back: golden below. Two or three bright yellow longitudinal bands along the sides: first dorsal fins black-edged and with two blackish bands: pectoral pinkish edged with white: upper caudal lobe crossed by six yellowish-brown bars having dark edges and a black tip, whilst on the lower lobe there are three oblique dark bars and a white tip.

Habitat.—Red Sea, East coast of Africa, seas of India, to the Malay Archipelago and beyond.

2. Upeneoides sulphureus, Plate XXX, fig. 3.

Upeneus sulphureus, Cuv. and Val. iii, p. 450; Bleeker, Révis. Mull. p. 4.

Upeneus bivittatus, Cuv. and Val. vii, p. 520.

Hypeneus vittatus, var. Cantor, Catal. p. 35.

Upeneoides bivittatus, Bleeker, Perc. p. 64 (in part); Day, Proc. Zool. Soc. 1867, p. 702 (variety).

Upeneoides sulphureus, Bleeker, Act. Soc. Ned. ii, Amboina, p. 45; Günther, Catal. i, p. 398; Kner, Novara Fische, p. 67.

Upeneoides fasciolatus, Day, Proc. Zool. Soc. 1868, p. 151.

B. iv, D. 8 | $\frac{1}{8}$, P. 15, V. 1/5, A. 7, C. 15, L. l. 35-38, L. tr. $2\frac{1}{2}$/7.

Length of head 1/4 to 5/21, of caudal 1/6, height of body $4\frac{1}{4}$ to 2/9 of the total length. *Eyes*—diameter 2/7 to 4/15 of length of head, $1\frac{1}{4}$ diameter from end of snout, and 1 apart. The maxilla reaches to below the first third of the orbit. Interorbital space nearly flat. Barbels reach to opposite the posterior edge of the orbit in the young, but to nearly below the angle of the preopercle in the adult. *Teeth*—in several villiform rows in both jaws, in an uninterrupted semilunar band on the vomer, and also present on the palate. *Fins*—first dorsal spine very small, the third a little longer than the second or the fourth, and 3/4 the height of the body below it: six rows of scales between the two dorsal fins: second dorsal 2/3 as high as the spinous: origin of anal below the second or third dorsal ray: ventrals reach rather above half-way to the anus: caudal rather deeply forked. *Scales*—ctenoid, on the head extending as far forwards as the snout, none on the preorbital bone. *Lateral-line*—tubes in an arborescent form on each scale. *Air-vessel*—absent. *Colours*—of a reddish-chestnut on the back, becoming silvery on the abdomen which in the adult is shaded with yellow. A purplish blotch on the opercle descending on to the subopercle. A brilliant golden stripe, two-thirds as wide as a scale, passes from the orbit to the upper third of the tail, there are generally two or three more below and parallel with it, and in the larger specimens a light band passes along the row of scales above the lateral-line. First dorsal milk-white edged with black, having two horizontal yellow lines finely dotted with black: second dorsal with only one band: caudal reddish,

with a black white-edged margin. In some specimens I have found the caudal with bands much as in *U. vittatus*, but fewer in number and lighter in shade. They possessed no air-vessel.

A species much similar exists in Madras, differing in that the eye is a little smaller, the maxilla reaches to below the front edge of the orbit: preorbital sealed. A few villiform teeth on the vomer, some also on the palate. *Fins*—second and third dorsal spines as high as the body. No band or marks on the fins. A female specimen full of roe a little above $6\frac{7}{10}$ inches long was captured in December, 1867.

Habitat.—Seas of India to the Malay Archipelago, attaining at least 5 inches in length.

3. Upeneoides cæruleus.

Day, Proc. Zool. Soc. 1868, p. 194.

B. iv, D. 7-8/9, P. 15, V. 1/5, A. 7, C. 15, L. l. 32-34, L. tr. $2\frac{1}{2}$/7.

Length of head 2/9 to 1/5, of caudal 1/6, height of body 2/9 to 1/4 of the total length. *Eyes*—diameter 2/7 of length of head, 1 diameter from end of snout, and also apart. The maxilla reaches to below the first third of the eye. Interorbital space flat. Opercle with two spines. Barbels do not reach so far as to below the angle of the preopercle. *Teeth*—in fine villiform rows in both jaws, in a single row on the vomer and palate. *Fins*—the first spine of the dorsal fin is minute or wanting, the longest equals the length of the head behind the middle of the eye, or two-thirds of that of the body below it: seven or eight rows of scales between the two dorsal fins: ventral reaches about half way to the anus, but is not quite so long as the pectoral: caudal forked. *Scales*—finely ctenoid, none on the preorbital bone. *Lateral-line*—the tubes are rather long and bifurcate in the first portion of the lateral-line, the branches subsequently are short and mostly spring from its upper side. *Air-vessel*—present. *Colours*—leaden colour superiorly, becoming dirty white below. First dorsal with a black tip, a whitish band along its centre and a badly marked one at its base: second dorsal dark with a light band along its centre: extremities of caudal stained with black and a band across the upper lobe: pectoral, ventral and anal yellowish.

Considering the time of year at which all the specimens have been captured and their small size, it is not improbable that they are the young of a larger species, as *U. vittatus*.

Habitat.—Madras, to 4 inches in length, most common during the months of June and July.

4. Upeneoides tragula, Plate XXX, fig. 4.

Upeneus tragula, Richardson, Ich. China, p. 220; Bleeker, Révis. Mull. p. 11.
Upeneoides variegatus, Bleeker, Perc. p. 64, and Act. Soc. Ned. ii, Amboina, p. 48.
Upeneoides tragula, Günther, Catal. i, p. 398; Kner, Novara Fische, p. 66.
Mullus tragula, Playfair, Fish. Zanz. p. 40.

B. iv, D. 7-8/$\frac{1}{8}$, P. 13, V. 1/5, A. $\frac{1}{7}$, C. 15, L. l. 30-32, L. tr. 2/7, Cæc. pyl. 6.

Length of head 2/9 to $4\frac{3}{4}$, of caudal 1/5, height of body 1/5 to 4/17 of the total length. *Eyes*—diameter 4/15 to 1/4 of the length of head, $1\frac{1}{2}$ diameters from end of snout, and 1 apart. The maxilla reaches to beneath the first third of the eye. Snout rather obtuse anteriorly. A strong preopercular spine, a smaller one at the shoulder just below the commencement of the lateral-line. Barbels reach to opposite the hind edge of the preopercle. *Teeth*—villiform in jaws, vomer, and palate. *Fins*—first spine of the dorsal fin minute or even absent, first dorsal very little higher than the second: anal commences slightly behind the origin of the second dorsal. *Scales*—ctenoid, covering snout and preorbital bone: two entire rows between the lateral-line and bases of the dorsal fin: some over forepart of dorsal and anal fins: four rows between the two dorsal fins. *Colours*—silvery, head and body spotted with brown, a brown longitudinal band passes from the eye through the snout to the base of the caudal fin: dorsal fin with dark, almost black, bands: each caudal lobe with five or six oblique black bars.

Habitat.—East coast of Africa, Andamans to the Malay Archipelago, attaining at least $4\frac{1}{2}$ inches in length. The specimen figured is from the Andaman islands.

5. Upeneoides bensasi, Plate XXX, fig. 5.

Mullus bensasi, Tem. and Schleg. Faun. Japon. Poissons, p. 30, pl. xi, f. 3.
Upeneoides bensasi, Bleeker, Verh. Bat. Gen. xxvi, Japan, p. 71; Günther, Catal. i, p. 399.
Upeneoides guttatus, Day, Proc. Zool. Soc. 1867, p. 938.
Upeneoides tragula, Günther, Zool. Record, 1867, p. 160 (not Richardson).

B. iv, D. 7/$\frac{1}{8}$, P. 15, V. 1/5, A. $\frac{1}{7}$, C. 15, L. l. 32-34, L. tr. 2/7.

Length of head from 4/17 to 2/9, of pectoral 2/13, of caudal 1/5, height of body 1/5 to 2/11 of the total length. *Eyes*—diameter from $4\frac{1}{4}$ to $4\frac{1}{2}$ in length of head, nearly or quite 2 diameters from end of snout, and $1\frac{1}{2}$ apart. The maxilla extends to beneath the front edge of the orbit. The barbels reach to below or rather behind the posterior margin of the preopercle. Preopercular spine small. Interorbital space nearly flat. *Teeth*—villiform in either jaw, in vomer, and palate. *Fins*—four rows of scales between the two dorsals, the first of which fins is higher than the second, the longest dorsal spine is two-thirds the height of the body below it and 1/3 more than the second dorsal: caudal forked. *Scales*—ctenoid. Two entire rows between the lateral-line and the bases of either dorsal fin. The central row along the median line of the abdomen with a blunt keel: scales on preorbital. *Lateral-line*—the tubules are very arborescent posteriorly, especially on their

upper side. *Air-vessel*—absent. Free portion of tail one half longer than high at its base. *Colours*—chestnut along the back, becoming golden on the abdomen: head reddish: a silvery stripe from the eye to the centre of the caudal fin, with a row of red spots above and another below it. Dorsals tipped with black and having two reddish bands across them: caudal reddish, the upper lobe having four oblique chestnut bars. Pectorals, ventrals, and anal yellow.

Jerdon observes (M. J. L. and S. 1851, p. 141) of the sea fishes of Madras, "I have common drawings of two other species of this genus, one of them spotted all over with small red spots, and dorsals and caudal barred with the same, called *Te nevere*, Tam. 4 inches long."

Habitat.—Madras to the Malay Archipelago. It appears to be abundant all the year round on the Coromandel coast attaining to five inches in length.

6. Upeneoides tæniopterus.

Upeneus tæniopterus, Cuv. and Val. iii, p. 451.

B. iv, D. 7/$\frac{1}{7}$, P. 15, V. 1/5, A. 7, L. l. 38, L. tr. 3/7; Cæc. pyl. 2.

Length of head, of caudal and height of body each 4/19 of the total length. *Eyes*—diameter 2/9 of length of head, 1$\frac{2}{3}$ diameters from end of snout, and 1$\frac{1}{2}$ apart. Interorbital space flat, a very slight rise from snout to the base of the first dorsal fin, a slight swelling over the snout in front of the eye. Opercular spine weak. Barbels reach to below the first third of orbit. *Teeth*—villiform in jaws, vomer and palate. *Fins*—first spine of the dorsal fin the highest and equal to two-thirds of the height of the body, the second very nearly as long: six rows of scales between the bases of the two dorsal fins: pectoral equal in length to the first dorsal spine: caudal deeply forked. *Lateral-line*—the tubes very arborescent posteriorly. *Air-vessel*—large. *Colours*—back reddish, becoming white on the abdomen. A large triangular reddish spot said to have existed on the free portion of the tail but not now apparent. First dorsal fin with three brownish longitudinal bands, second dorsal likewise banded: caudal with six oblique streaks across either lobe.

Habitat.—Ceylon to Australia, attaining at least 12 inches in length. The description is taken from Val.'s type specimen in the Jardin des Plantes at Paris.

Genus, 2—Mulloides, *Bleeker.*

Upeneus, sp. Cuv. and Val.

Definition as in the family, except that the teeth in the jaws are in several rows: palate edentulous.

Geographical distribution.—From the Red Sea and East coast of Africa, through the seas of India to the Malay Archipelago and beyond.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Mulloides flavolineatus*, D. 7/$\frac{1}{8}$, A. 7, L. l. 36-37. Barbels thick and reach the hind edge of preopercle. A yellow band from eye to middle of base of caudal. From Red Sea, through those of India to the Malay Archipelago and beyond.

1. Mulloides flavolineatus, Plate XXX, fig. 6.

? *Mullus auriflamma*, Forsk. p. 30; Gmel. Linn. p. 1340; Bl. Schn. p. 79.
Mullus flavolineatus, Lacép. iii, p. 406.
Mullus aureovittatus, Shaw, Zool. iv, p, 618.
Upeneus flavolineatus, Cuv. and Val. iii, p. 456; Rüpp. N. W. Fische, p. 101, t. 26, f. 1; Jenyns, Voy. Beagle, Fishes, p. 24.
Upeneus Zeylonicus, Cuv. and Val. iii, p. 459, and vii, p. 520.
Upeneus auriflamma, Cuv. and Val. iii, p. 461.
? *Hypeneus flavolineatus*, var. Cantor, Catal. p. 36.
Mulloides flavolineatus, Bleeker, Ceram. ii, p. 697, and Révis. Mull. p. 15; Günther, Catal. i, p. 403, and Fische d. Sudsee, p. 56; Kner, Novara Fische, p. 69 (not syn.).
Mulloides Zeylonicus, Bleeker, Nieuw-Guinea, p. 8, and Révis. Mull. p. 16; Günther, Catal. i, p. 404.
Mulloides auriflamma, Klunz.* Fische d. roth. Meer. Verh. z. b. Ges. Wien, 1870, p. 742.

B. iv, D. 7/$\frac{1}{8}$, P. 17-19, V. 1/5, A. $\frac{2}{6}$, C. 15, L. l. 35-36, L. tr. 2/6, Cæc. pyl. 18.

Length of head 3/13, of caudal from 2/9 to 1/5, height of body from 4/21 to 1/5 of the total length. *Eyes*—diameter 3$\frac{1}{2}$ to 1/4 in length of head, 1$\frac{2}{3}$ of a diameter from end of snout, and 1 apart. The maxilla reaches two-thirds of the distance to below the front edge of the orbit. Interorbital space flat. The barbels, which are thick, extend to opposite or rather posterior to the hind margin of the preopercle. Opercular spine rather weak. Snout somewhat compressed and pointed. *Teeth*—in villiform bands in jaws. *Fins*—first three dorsal spines of about the same length and equal to three-fourths of the height of the body. Five rows of scales between the two dorsal fins. Second dorsal anteriorly half to two-thirds as high as the first, its last rays only half as long as its front ones. The length of the pectoral equals that of the head in front of the hind edge

* Bleeker considers *Mulloides ruber*, Klunz. l. c. p. 75 this species: in Garrett's Fische d. Sudsee, t. 43, f. A, is a figure of Klunzinger's species life-size, showing about 40 rows of scales along the lateral-line. Günther gives it at 42-43.

of the orbit. Anal of the same shape as the second dorsal, its first spine minute: it commences slightly behind the origin of the second dorsal. Caudal deeply forked, its lobes pointed. Free portion of the tail 1½ times as long as it is high at its commencement. *Scales*—ctenoid, extending as far forwards as the snout, none on the preorbital bone: three rows on the cheeks, also between the lateral-line and the base of the second dorsal fin. *Lateral-line*—tubes very arborescent, especially anteriorly. *Air-vessel*—large. *Colours*—upper surface of the head and back reddish-chestnut, becoming whitish along the sides, and tinged with yellow on the abdomen. A narrow yellow band from the upper edge of the eye to the snout, and a second from below the eye joins it. A brilliant golden band, rather above one scale in width, passes from the hind edge of the eye to the middle of the base of the caudal fin. Fins flesh-coloured, a yellow band along the base of the second dorsal: lower lobe of caudal grey.

Having examined Val.'s type of *Upeneus Zeylonicus* I consider it to be this species.

Habitat.—Red Sea, through those of India to the Malay Archipelago and beyond. The specimen figured is 10 inches long and from the Andamans.

Genus, 3—Upeneus, (*Cuv. and Val.* pt.) *Bleeker.*

Mullupeneus, Poey; *Parupeneus*, Bleeker (1874).

Definition as in the family, except that only a single row of teeth exists in either jaw, whilst the palate is edentulous.

Geographical distribution.—From the Red Sea and East coast of Africa, through the seas of India to the Malay Archipelago and beyond.

1. *Upeneus macronemus*, D. 8/9, A. 7, L. l. 29-30. Last dorsal and anal rays produced. A black band from the eye to below the end of the soft dorsal, a black blotch at the base of the caudal: a deep black band along the base of the second dorsal: ventral blackish externally. Red Sea, through those of India to the Malay Archipelago and beyond.

2. *Upeneus barberinus*, D. 8/9, A. 7, L. l. 29-31. Last dorsal and anal rays not produced. A black lateral band from the eye to below the end of the soft dorsal: a black spot at the base of the caudal: in some specimens a dark band along the base of the second dorsal. Red Sea, those of India to the Malay Archipelago and beyond.

3. *Upeneus multifasciatus*, D. 8/9, A. 7, L. l. 30-32. A dark vertical band from below the second dorsal to the lateral-line: a second over the free portion of the tail. A black band along the base of the second dorsal: dark lines on the anal. Seas of India to Polynesia.

4. *Upeneus luteus*, D. 8/9, A. 7, L. l. 30. Eyes, diameter 6⅓ in length of head. Light lines about the head: golden spots on many of the scales: second dorsal and anal with three to five longitudinal lines. East coast of Africa through the seas of India.

5. *Upeneus displurus*, D. 8/9, A. $\frac{1}{7}$, L. l. 29. Eyes, diameter 4⅔ in length of head. Some light lines upon the head and golden spots on most of the scales of the body. Second dorsal and anal with narrow bands: caudal reticulated. Coasts of Sind.

6. *Upeneus Indicus*, D. 8/9, A. $\frac{1}{7}$, L. l. 30. Purplish-red, with a large oval shining golden blotch on the lateral-line opposite the interspace between the two dorsal fins; a purplish-black mark on the side of the free portion of the tail. Seas of India to China.

7. *Upeneus cinnabarinus.* Red vermilion: upper caudal lobe orange, lower red. A large purplish blotch over the opercle and subopercle. Ceylon.

1. Upeneus macronemus, Plate XXXI, fig. 1.

Mullus macronema, Lacép. iii, pp. 383, 404, pl. 13, f. 2.
Mullus auriflamma, Lacép. iii, p. 400, pl. 13, f. 1 (not Forsk.).
Upeneus lateristriga, Cuv. and Val. iii, p. 463; Rüppell, N. W. Fische, p. 101; Bleeker, Celebes, p. 242.
Upeneus macronemus, Bleeker, En. Pisces, Arch. Ind. p. 37; Günther, Catal. i, p. 405; Klunz. Fische d. roth. Meer, p. 744.
Mullus macronemus, Playfair, Fish. Zanz. p. 40.
Parupeneus macronema, Bleeker, Amboina, p. 281, and Révis. Mull. p. 24.

B. iv, D. 8/9, P. 16, V. 1/5, A. 7, C. 15, L. l. 29-30, L. tr. 2½/7.

Length of head 3/11 to 1/4, of caudal 1/5, height of body 1/4 to 4⅓ in the total length. *Eyes*—diameter 1/5 of length of head, 2½ diameters from end of snout, and 1¼ apart. Greatest height of head equals its length excluding the opercle. The maxilla reaches two-thirds of the distance to below the front edge of the eye. Lips thick. Interorbital space rather convex. Opercular spine rather strong. Barbels reach to nearly opposite the hind edge of the opercle. *Teeth*—in a single row in both jaws. *Fins*—first spine of dorsal short, the third and fourth equal the length of the head in front of the hind edge of the orbit, and nearly or quite twice as high as the anterior dorsal rays: last dorsal and anal rays very elongated: ventral a little longer than the pectoral: caudal forked. *Scales*—finely ctenoid, present on the snout, maxilla and cheeks, not on the preorbital: three rows between the two dorsal fins, and two entire ones between the lateral-line and the bases of the dorsal fins. No enlarged pores on the snout. *Lateral-line*—with several short bifurcations posteriorly. Free portion of tail

longer than high at its commencement. *Colours*—a black band passes from the snout through the eye, at first just below the lateral-line, subsequently upon it, and ending below the end of the soft dorsal, it is $1\frac{1}{2}$ scales in depth at its widest part: a black blotch at the base of the caudal fin, these two marks are divided by a light oblique vertical band which passes over the free portion of the tail just behind the second dorsal fin: some golden spots exist on the scales along the sides of the body. A purplish stripe goes from the eye to the snout. First dorsal violet, second dorsal with a deep black band along its base, it has several irregular transverse lines along its upper half: pectoral with a dark base: ventral blackish externally, reticulated internally: anal with narrow transverse lines as in the upper half of the soft dorsal, but of a violet colour: caudal with a black edging.

A specimen in the Calcutta Museum has on it an old label with *Apogon Amherstinus*. It was probably brought from Amherst by Blyth, but I am unable to find any record of the name having been published.

Habitat.—Red Sea, those of India to the Malay Archipelago and beyond, attaining at least $8\frac{1}{2}$ inches in length.

2. Upeneus barberinus.

Mullus barberinus, Lacép. iii, p. 406, pl. 13, f. 3.

Upeneus barberinus, Cuv. and Val. iii, p. 642; Rüpp. N. W. Fische, p. 101; Bleeker, Perc. p. 172; Günther, Catal. i, p. 405; Kner, Novara Fische, p. 70; Klunz. Fische d. roth. Meer. Verh. zool. bot. Ges. Wien, 1870, p. 745; Garrett, Fische d. Sudsee, t. 42.

Parupeneus barberinus, Bleeker, Ternate, p. 234, and Révis. Mull. p. 25.

B. iv, D. 8/9, P. 18, V. 1/5, A. 7, C. 15, L. l. 29-31, L. tr. $2\frac{1}{2}$/7.

Length of head 2/7 to 1/4, of caudal 1/5, height of body 2/9 to 1/5 of the total length. *Eyes*—diameter 2/11 of length of head, 3 diameters from end of snout, and $1\frac{1}{4}$ apart. The maxilla reaches to nearly midway between the end of the snout and the front edge of the eye. Opercular spine rather strong. Barbels reach to rather beyond the vertical from the angle of the preopercle. *Teeth*—in a single row of moderately sized ones in the jaws. *Fins*—first spine of dorsal fin very short, the third, sometimes also the fourth, the highest and equalling the length of the head in front of the hind edge of the orbit, in a large specimen rather more, and about twice the height of anterior dorsal rays: second dorsal fin not having its last rays prolonged: pectoral nearly as long as the longest dorsal spine and equal to the ventral: caudal forked. *Scales*—finely ctenoid, present on snout and cheeks but none on the preorbital bone. Three rows between the two dorsal fins, and two entire ones between the lateral-line and bases of the dorsal fins. *Lateral-line*—tubules with several rather long bifurcations posteriorly. Free portion of tail longer than high at its base. *Colours*—a black band passes from the eye along the lateral-line and from below the middle of the second dorsal it becomes above that line ending 2/3 of a scale above it below the end of the second dorsal: a round black spot at the root of the caudal. In some specimens there is a darkish band along the dorsal fins.

The similarity between this species and *U. macronemus* is so great that I have not considered it necessary to figure both. In *U. barberinus* the bands, especially on the fins, are much lighter, and the last dorsal and anal rays not elongated as in *U. macronemus*. Both are abundant at the Andamans, and I would suggest an examination of their sexes and the number of cæcal appendages in either sex.

Habitat.—Red Sea, through those of India, to the Malay Archipelago and beyond, attaining at least 12 inches in length.

3. Upeneus multifasciatus.

Mullus multifasciatus, Quoy and Gaim. Voy. Uranie, p. 330, Atl. t. lix, f. 1.

Upeneus trifasciatus, Cuv. and Val. iii, p. 468; Jenyns, Voy. Beagle, Fish. p. 25; Bleeker, Banda, p. 237; Günther, Catal. i, p. 407 (Synonym. in part); Kner, Novara Fische, 71; Garrett's Fische d. Sudsee, pl. 44, B.C.

Parupeneus multifasciatus, Bleeker, Madagascar, p. 42, t. xix, f. 3.

B. iv, D. 8/9, P. 17, V. 1/5, A. 7, C. 15, L. l. 30-32, L. tr. $2\frac{1}{2}$/7, Vert. 10/14.

Length of head 1/4 to 4/15, of caudal $4\frac{3}{4}$ to 1/5, height of body 1/4 to $4\frac{1}{4}$ in the total length. *Eyes*—diameter 1/5 to 1/6 of length of head, $3\frac{1}{2}$ diameters from end of snout, and $1\frac{1}{3}$ apart. Interorbital space very convex, no open pores on preorbital bone. The maxilla, which is very broad posteriorly, reaches a little above half way to below the orbit. Barbels extend 1 diameter of the orbit behind the posterior edge of the preopercle. *Teeth*—in a single conical row in the jaws. *Fins*—first spine of dorsal minute, third the longest and equal to the length of the head in front of the middle of the eye, and twice as high as the anterior dorsal rays: three rows of scales between the bases of the two dorsal fins. Pectoral as long as the head anterior to the hind edge of the eye: anal commences on the vertical below the third or fourth dorsal ray, it is usually longer at its base than it is high, but in a beautiful figure of this species in Bleeker's Madagascar, l. c. the last dorsal ray is elongated: ventral reaches the anus: caudal forked. *Scales*—ctenoid, present on the snout, cheeks and upper jaw, but not on the preorbital bone: $2\frac{1}{2}$ rows between the lateral-line and the bases of the dorsal fins. *Lateral-line*—tubes arborescent posteriorly. Free portion of tail somewhat longer than it is high at its base. *Colours*—purplish, a black horizontal band usually exists on the snout, and is continued through the eye sometimes to a good distance behind it. Two or three wide black bands descend from the two dorsal fins or the interspace between

them to the middle of the body, their number may be decreased by their amalgamating into one, or increased by their being split up into several. There is usually a third band over the free portion of the tail or a spot on the side of its base. Second dorsal, anal, and sometimes the outer half of the ventral finely banded, occasionally a dark basal band exists on the second dorsal.

Habitat.—Seas of India, to the Malay Archipelago and beyond.

4. Upeneus luteus, Plate XXXI, fig. 2.

Upeneus luteus (? Cuv. and Val. vii, p. 521); Bleeker, Perc. p. 63.

Upeneus cyclostoma, Günther, Catal. i, p. 409 (not Cuv. and Val.); (? Klunz. Fische R. M. Verh. z. b. Ges. Wien, 1870, p. 745.)

Mullus luteus, Playfair, Fish. Zanz. p. 41.

Parupeneus luteus, Bleeker, Amb. p. 281, and Révis. Mull. p. 32.

B. iv, D. 8/9, P. 15, V. 1/5, A. 7, C. 15, L. l. 30, L. tr. 2/7.

Length of head 1/4, of caudal 1/5, height of body 1/4 of the total length. *Eyes*—diameter $6\frac{1}{3}$ in the length of the head, $3\frac{1}{2}$ diameters from the end of snout, and $1\frac{2}{3}$ apart. Height of head nearly equals its length. Interorbital space a little convex: the profile from the snout to the base of the first dorsal fin is in a moderate and even curve. No open pores on the preorbital. The maxilla reaches to about midway between the snout and the hind margin of the orbit. Barbels with roughened elevations along their whole length and extending to a little behind the posterior edge of the preopercle. Opercular spine of moderate size. *Teeth*—a single row of conical ones in either jaw. *Fins*—first spine of dorsal minute, the third and fourth the longest and equal to $1\frac{1}{3}$ in the height of the body and nearly twice as high as the anterior dorsal rays: three rows of scales between the bases of the two dorsal fins: pectoral three-fourths as long as the head: caudal deeply forked, the lobes pointed. *Scales*—ctenoid, present on snout, maxilla and cheeks, none on the preorbital bone. Two entire rows between the lateral-line and the bases of the dorsal fins. *Lateral-line*—the branches of the tubes very short but numerous. Free portion of tail rather longer than high at its base. *Colours*—reddish, the edges of the scales somewhat the darkest. A broad purplish band, having a light yellow edge on either side, goes from below and in front of the eye to the snout: the lower band is continued backwards across the upper edge of the opercle where it joins another from the lower edge of the eye: a third narrow yellow band goes from the upper edge of the eye backwards. Outer edge of preopercle purplish. The centre of each scale on the body, except the first thirteen of the lateral-line, has a golden spot: abdomen yellowish. Second dorsal and anal with from three to five bluish longitudinal lines.

This species very nearly resembles the figure of *U. Vlamingii*, C. V. iii, pl. 71, but has its second dorsal much lower.

Habitat.—East coast of Africa and seas of India, attaining at least a foot in length. Specimen 12 inches long.

5. Upeneus displurus, Plate XXXI, fig. 3.

Mullus displurus, Playfair, Fish. Zanzibar, p. 41, pl. v, fig. 4 (not 3) adult.

Mullus pleurotænia, Playfair, l. c. fig. 3 (not 4) young.

B. iv, D. 8/9, P. 15, V. 1/5, A. $\frac{1}{7}$, C. 16, L. l. 31, L. tr. 2-$2\frac{1}{2}$/7.

Length of head $3\frac{3}{4}$ to almost 1/4, of caudal 1/5, height of body 2/9 to $4\frac{3}{4}$ in the total length. *Eyes*—diameter 3/14 to 1/5 of length of head, $1\frac{1}{3}$ to $1\frac{1}{2}$ in the postorbital portion of the head, $2\frac{1}{3}$ to $2\frac{1}{2}$ from end of snout, and $1\frac{1}{4}$ apart. Snout pointed, compressed. The maxilla reaches to rather more than half way below the front edge of the orbit. Barbels extend to below the hind margin of the preopercle. Interorbital space slightly convex: opercular spine of moderate strength. *Fins*—fourth dorsal spine rather the longest and equal to three-fourths of the height of the body below it: three rows of scales between the two dorsal fins: front portion of the second dorsal equals two-thirds the height of the first dorsal: pectoral as long as the head anterior to the hind edge of the orbit: anal commences slightly behind the origin of the second dorsal: caudal deeply forked and the lobes pointed. *Scales*—on snout and head including most of the preorbital bone: the uncovered portion has some rather large pores. *Colours*—reddish, the edges of the scales being slightly darkest. A broad purplish band, having a light silvery edge, passes from in front of the eye to the snout: two more narrow silvery lines, formed of short oblong spots, proceed from hind edge of orbit for a short distance: the two rows above the lateral-line, and generally the three below, have a golden-yellow spot in the centre of each scale: a light golden band over the free portion of the tail. First dorsal marbled with brown, the second with four and the anal with three reddish bands: caudal reticulated with light grey markings. Specimens from the East coast of Africa are said to have two shining light longitudinal bands, the first from the orbit to the middle of the soft dorsal, and the second, which is broader, from the upper lip to the middle of the back.

Some confusion appears to have occurred respecting Colonel Playfair's two species, the markings stated to exist on the fins of *pleurotænia* are shown on those of *displurus* by the artist. In the type specimens I am unable to trace any spots on the fins, whilst the two shining longitudinal bands are very distinct, but they are also slightly apparent in the large specimen. Also the dark band over the tail is present in the smaller specimens as well as in the large one. The situation of the eyes as shown by the artist appear to me to be correct although at variance with the text.

If the foregoing species are merely to be recognised by their markings, then the one I procured in Sind, where it is abundant, can hardly be more than another form of colouring, consequently those who hold the *displurus* and *pleurotænia* to be distinct, would probably consider this as a separate species.

Habitat.—Sind, where it attains at least $9\frac{1}{2}$ inches in length, probably also found in East Africa. The specimen figured is $8\frac{1}{2}$ inches long.

6. Upeneus Indicus, Plate XXXI, fig. 4.

Mullus Indicus, Shaw, Zool. iv, pt. ii, p. 614.
Mullus barbatus, Russell, ii, p. 42, pl. 157 (not Linn.).
Upeneus Russellii, Cuv. and Val. iii, p. 465; Richards. Ich. China, p. 220; Bleeker, Perc. p. 62.
Upeneus Waigiensis, Cuv. and Val. iii, p. 466.
Upeneus Malabaricus, Cuv. and Val. iii, p. 467; Günther, Catal. i, p. 407, and Fische d. Sudsee, p. 58, pl. xlv, f. B.
Upeneus Indicus, Günther, Catal. i, p. 406; Day, Fishes of Malabar, p. 28.
Parupeneus Russellii, Bleeker, Ternate, p. 234.
Mullus Malabaricus, Playfair, Fish. Zanz. p. 41.
Parupeneus Indicus, Bleeker, Bouro, p. 148, and Révis. Mull. p. 27.
Rahtée goolivinda, Tel.: *Mussara*, Tam.

B. iv, D. 8/9, P. 16, V. 1/5, A. $\frac{0-1}{7}$, C. 15, L. l. 30, L. tr. $2\frac{1}{2}$/7.

Length of head from 4/15 to 1/4, of caudal 1/5 to 3/16, height of body 4/15 to 1/4 of the total length. *Eyes*—situated in the anterior portion of the posterior half of the head, or even a little behind it, and from 2/11 to 2/13 (larger in the young) of its length, $1\frac{1}{4}$ diameters apart. Snout somewhat pointed. The maxilla reaches rather more than half way to below the front edge of the orbit. Interorbital space more or less convex. Barbels reach to beyond the angle of the preopercle. Opercular spines small. *Teeth*—generic. *Fins*—first spine of anterior dorsal minute, the third and fourth the longest, 1/2 higher than the rays, and equalling three-fourths of the height of the body. Pectoral as long as the head in front of the hind edge of orbit: anal commences slightly behind the level of the second dorsal and is as high as it: caudal deeply forked, the lobes pointed. *Scales*—finely ctenoid, extending on the head as far forwards as the snout, but none on the preorbital bone: two entire rows between the lateral-line and the bases of either dorsal fins. Free portion of the tail longer than high at its commencement. *Lateral-line*—tubes becoming very arborescent posteriorly. *Air-vessel*—present. *Colours*—purplish-red, with a large oval shining golden blotch on the lateral-line opposite the interspace between the two dorsal fins, which usually disappears after death; a purplish-black mark, lightest in its centre, on either side of the free portion of the tail between the end of the dorsal and the base of the caudal fins: yellow lines or spots on the abdomen. Some light violet lines on the upper surface of the head. A broad purple band from the eye to the snout, having a narrow violet one on either side: cheeks pink, variegated with yellow and tortuous blue lines: a dark spot at the corner of the mouth. Dorsal purplish streaked with blue: a few yellow bands on anal, fins pinkish except the caudal, which has the rays purplish, but the membrane has a greenish tinge.

Amongst Sir W. Elliot's drawings is one of this species labelled *Upeneus Russellii* and *Kul naveri*, Tam. Jerdon observes, M. J. L. and Sc. 1851, p. 140: "this very beautiful fish is rarely met with at Madras": Russell also made much the same remark—however, I have frequently obtained it there.

The species I considered *U. spilurus* from the Andamans I find to be *U. Indicus*: the *U. Malabaricus* has been considered to differ in wanting the spine to the anal fin and thus having only seven rays.

Habitat.—Red Sea, East coast of Africa, seas of India to the Malay Archipelago and beyond, attaining at least 16 inches in length.

7. Upeneus cinnabarinus.

Cuv. and Val. iii, p. 475.

B. iv, D. 8/9, P. 15, V. 1/5, A. 7, C. 15, L. l. 29, L. tr. 3/7.

Length of head 1/4, of caudal 1/5, height of body 4/17 of the total length. *Eyes*—diameter 1/4 of length of head, nearly 2 diameters from end of snout, and 1 apart. The dorsal profile makes a considerable rise from the snout to above the centre of the eyes. The maxilla reaches to below the front edge of the orbit. A rather strong opercular spine. Barbels rather thick and reach to below the front edge of the orbit. *Teeth*—conical and in a single row in either jaw. *Fins*—first spine of dorsal fin short, the second not quite so long as the third which equals rather above one-third of the height of the body below it: the pectoral as long as the head posterior to the front nostril: caudal deeply forked. *Scales*—three rows between the two dorsal fins. *Lateral-line*—the tubes very arborescent posteriorly. *Air-vessel*—small. *Colours*—of a vermilion, darkest on the back, now there appears to be a central silvery spot in the middle of each scale forming the two rows above and the two below the lateral-line. Dorsal and anal rays yellow, the membrane reddish: upper caudal lobe orange, the lower one red. A large purple spot covers the opercle and descends on to the subopercle. Barbels rosy.

Habitat.—Ceylon, where it is said to be abundant. The above description is taken from Valenciennes type specimen in the Jardin des Plantes at Paris.

FAMILY, IV—NANDIDÆ, *Günther.*

Pseudochromides, pt., et *Mœnoidei*, pt. Müll. & Trosch.

Branchiostegals from five to six: pseudobranchiæ present in marine genera, but sometimes concealed or absent in those of the fresh-water. Body oblong and compressed. Teeth feeble, but dentition more or less complete. Dorsal fin single: the length of the base of the spinous portion of greater or equal extent to that of the soft: anal with three spines, its rays similar to those of the dorsal: ventrals thoracic, with one spine and four or five rays. Scales ctenoid, covering the body. Lateral line interrupted or absent. No super-branchial organ. Air-vessel present. Pyloric appendages few or absent.

Dr. Günther's family *Nandidæ* is composed of three groups, his *Nandina* being similar to *Nandoides*, Bleeker, containing the Genera *Nandus*, C.V., *Badis*, Bleeker, and *Pristolepis*, Jerdon=*Catopra*, Bleeker, which Bleeker observes belong to the great Family *Percidæ*.* Thus restricted, this small group would find a natural place between the *Centrarchini (Grystina*, pt.) and the *Osphromenoides (Labyrinthibranchii)* and the *Polycentroïdes*. It also approaches the *Pseudochromidoïdes* and the *Cichloïdes*. The dentition inside its mouth distinguishes it from the groups enumerated.

Geographical distribution.—Of the Asiatic Genera of Family *Nandidæ*, Günther, some are marine, others fresh-water fishes, extending their range from the Red Sea and East coast of Africa, through those of India, the Malay Archipelago and beyond.

The colours in some are liable to considerable variations, due to age, probably season, and the locality they inhabit. The number of spines, rays, and even scales, as in the indigenous fresh-water Acanthopterygian genera, *Ambassis*, *Anabas*, *Polyacanthus* and *Trichogaster* are by no means fixed, a few more or less being of no infrequent occurrence. The same remark applies to the serrations of the bones of the head as they often vary in specimens from different parts, which however can merely allow their being classed as local varieties and not distinct species.

SYNOPSIS OF GENERA.

First group—Plesiopina.

Pseudobranchiæ present: ventral with four rays.

1. *Plesiops.* Pseudobranchiæ. None of the bones of head serrated. Villiform teeth in jaws and palate, none on tongue. The first one or two of the ventral rays elongated and bifid. Red Sea, through those of India to the Malay Archipelago.

Second group—Nandina.

Pseudobranchiæ absent: ventral with five rays.

2. *Badis.* None of the bones of head serrated. Villiform teeth in jaws, palate, root of tongue and roof of cavity of mouth. Fresh waters of India and Burma.
3. *Nandus.* Opercles may be serrated or armed. Villiform teeth in jaws, palate, root of tongue and cavity of mouth. Fresh waters of India and Burma.
4. *Pristolepis.* Opercles serrated or armed. Villiform teeth in jaws and palate, with globular crowns at the root of tongue and roof of cavity of mouth. Fresh waters of India, Burma, Siam to the Malay Archipelago.

First group—Plesiopina.

Pseudobranchiæ present: ventral with four rays.

Genus, 1—PLESIOPS, *Cuv.*

Pharopteryx, Rüpp.

Branchiostegals six: pseudobranchiæ. Body oblong and compressed. Mouth moderately protractile. None of the bones of the head serrated. Villiform teeth on the jaws, vomer, and palatines, none on the tongue. Eleven to twelve spines in the dorsal fin, three in the anal: ventral with one spine and four rays, the outer ones being elongated and bifid. Scales cycloid, of moderate size. Lateral-line interrupted. Air-vessel present. Pyloric appendages absent.

Geographical distribution.—Red Sea, through those of India to the Malay Archipelago.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Plesiops nigricans*, D. $\frac{12}{7-8}$, A. $\frac{3}{8}$, L. l. 23-28. Each scale on the body with a blue central spot: a large

* Dr. Günther's classification is adhered to for reasons stated in note at p. 2.

black blue-edged ocellus on the opercles, a blue line along the dorsal and anal fins which, as well as the caudal, have a light edge: blue spots on soft dorsal, anal and caudal fins. Red Sea, through those of India to the Malay Archipelago.

1. **Plesiops nigricans,** Plate XXXI, fig. 5.

Pharopteryx nigricans, Rüpp. Atl. p. 15, t. iv, f. 2, and N. W. Fische, p. 5.

Plesiops cæruleo-lineatus, Rüpp. N. W. Fische, p. 5, t. ii, f. 5; Bleeker, Amboina, iii, p. 116; Günther, Catal. iii, p. 363.

Plesiops melas, Bleeker, Verh. Bat. Gen. xxii, Bali, p. 9.

Plesiops corallicola, (K. and v. H.) Bleeker, Sumatra, ii, p. 280; Günther, Catal. iii, p. 364; Day, Proc. Zool. Soc. 1870, p. 685; Kner, Novara Fische, p. 214.

Plesiops nigricans, Günther, Catal. iii, p. 363; Klunz. Verh. z. b. Ges. Wien, 1871, p. 517.

B. vi, D. $\frac{12}{7-8}$, P. 21, V. 1/4, A. $\frac{3}{8}$, C. 16, L. l. 23-28, L. tr. $2\frac{1}{2}$/10.

Leugth of head from 4/15 to 1/4, of pectoral 2/11, of caudal 2/9, height of body 2/9 of the total length. *Eyes*—diameter 1/4 to 1/5 of length of head, 3/4 to 1 diameter from end of snout, and 1 apart. Snout obtuse. The maxilla reaches to behind the posterior edge of the orbit. *Teeth*—villiform in the jaws, vomer and palatines, none on the tongue, the outer row of teeth in the upper jaw are usually slightly enlarged. *Fins*—dorsal spines much shorter than the rays, the interspinous membraue (which extends beyond the tips of each spine) deeply emarginate, soft portion of the fin and also of the anal pointed: two outer ventral rays elongated: third anal spine the longest: caudal pointed. *Scales*—finely ctenoid iu the last half of the body. *Colours*—brownish, each scale on the body with a blue centre, some of those on the shoulder and head with several blue spots. Opercle with a large black blue-edged ocellus. A blue band along the dorsal and anal fins: dorsal, caudal and anal with a white margin: soft dorsal and anal with blue streaks in the direction of the rays, they are also present on the caudal but in the form of transverse blotches.

Habitat.—From the Red Sea, through those of India to the Malay Archipelago and beyond. It is very common at the Andaman islands, attaining at least 6 inches in length.

Second group—Nandina.

Pseudobranchiæ concealed or absent: palatine and vomerine teeth: ventral with five rays.

Genus, 2—BADIS, *Bleeker.*

Branchiostegals six: pseudobranchiæ apparently absent. Eyes lateral. Mouth protractile. Opercle with one sharp spine, none of the other bones of the head armed. Villiform teeth on the jaws, vomer and palatines, absent from the tongue. A single dorsal fin, the spinous portion being of much greater extent than that of the soft: anal with three spines, its rayed portion similar to that of the dorsal. Scales ctenoid, of moderate size. Lateral-line interrupted or absent. Air-vessel large and simple. Pyloric appendages absent.

Geographical distribution.—Fresh waters of the hills and plains of India and Burma.

Hamilton Buchanan observed of his two species of *Badis*, that "the two following species I refer to the genus *Labrus*, although their almost total want of teeth would perhaps require their forming a distinct genus. Notwithstanding the form of their tail fins, they approach nearer the *Labrus malapterus* of Bloch, (*Ichth.* t. ix, p. 26, pl. 296, f. 2) than to any other fish described by that author," p. 70.

SYNOPSIS OF SPECIES.

1. *Badis Buchanani*, D. $\frac{16-17}{8-7}$, A. $\frac{3}{6-7}$, L. l. 26-32 interrupted. Purplish and banded, or irregularly spotted or blotched. Fresh waters of India and Burma.

2. *Badis dario*, D. $\frac{14}{8}$, A. $\frac{3}{7}$, L. l. 26-30 absent. Stone colour, with several dark vertical belts, most being in the posterior half of the body. Bengal, Behar and Western ghauts.

1. **Badis Buchanani,** Plate XXXI, fig. 6.

Labrus badis, Ham. Buch. Fish. Ganges, pp. 70, 368, pl. 25, fig. 23.

Badis Buchanani, Bleeker, Verh. Bat. Gen. xxv, t. 2, f. 3; Günther, Catal. iii, p. 367.

Kala-poo-ti-ah and *Chiri*, Punj.: *Kundala* and *Ka-sundara*, Tel.: *Kahlee-poee* and *Bundei*, Ooriah: *Nabat* and *Ran-doh-nee*, Assam.: *Pin-lay-nga-ba-mah* and *Nga-mee-loung*, Burm.

B. vi, D. $\frac{16-18}{7-10}$, P. 12, V. 1/5, A. $\frac{3}{6-8}$, C. 16, L. l. 26-32, L. tr. $2\frac{1}{2}$/8.

Length of head 2/9 to 1/5, of pectoral 1/5, of caudal 2/9, height of body $2\frac{3}{4}$ to 2/9, in the variety figured, iu the total length. Form of body an elongated oval, sides compressed. *Eyes*—diameter $3\frac{2}{3}$ (3/11) of the length of head, 2/3 of a diameter from end of snout, and 1 apart. The maxilla reaches to below the front edge of the orbit: lower jaw slightly the longer. *Teeth*—villiform in jaws, vomer and palatines, also on pre-sphenoid and epi-hyal. *Fins*—spines somewhat slender, the soft portion of the fiu rather elevated and pointed: anal spines short, its soft portion similar to that of the dorsal: caudal pointed. Variations, as in other Acanthopterygian fresh-water fishes, exist in the number of spines and rays; in Bengal and Madras the formula is generally D. $\frac{16-17}{8-7}$, A. $\frac{3}{6-7}$, L. l. 26-28, but in Assam and Burma it is mostly as follows: D. $\frac{17-18}{9-10}$, A. $\frac{3}{8}$, L. l. 28-33.

Scales—ctenoid, extending over the body and head, there are two or three small rows along the bases of the dorsal and anal fins, and some minute ones are often present on the rays of the vertical fins, one entire row exists between the highest portion of the lateral-line and the small scales along the base of the dorsal fin. *Lateral-line*—interrupted below the posterior extremity of the dorsal fin. *Air-vessel*—large, with thin walls. *Colours*—subject to great variation. In India proper, including the Punjab and Sind, the body is variegated with alternate belts of black and green; but in old fishes, especially if captured in dirty water, these bands are black and dirty red. On each shoulder there is usually a bluish-black spot, another is often present on the opercle, and a third at the base of the caudal fin. In specimens from Assam and Burma a different mode of colouring obtains. In Assam, in the variety figured, they are of a dull red, blotched or spotted with black; but in Burma these spots take the form of six vertical bands, each being formed by four transverse blotches one above the other; a large one is situated on the shoulder, and another on the side of the free portion of the tail: all the vertical fins have a narrow white edge.

Habitat.—Fresh waters of India and Burma, attaining at least $3\frac{1}{2}$ inches in length. I obtained several at Mandalay in Upper Burma from a canal which was being baled out.

2. Badis dario.

Labrus dario, Ham. Buch. Fish. Ganges, pp. 72, 368.
Badis dario, Günther, Catal. iii, p. 367.
Kunkakie, Ooriah: *Ka-sondara*, Tel.

B. vi, D. $\frac{14}{8}$, P. 9, V. 1/5, A. $\frac{3}{7}$, C. 15, L. l. 26-30, L. tr. 11.

Length of head 1/4, of caudal nearly 1/4, height of body 1/4 of the total length. Under jaw slightly the longer. *Eyes*—diameter 1/3 of length of head, 1/2 a diameter from end of snout, and also apart. *Teeth*—minute as in the last species. *Fins*—dorsal spines slender, the soft portion as well as of the anal pointed: caudal wedge-shaped. *Scales*—rather large. *Lateral-line*—absent. *Colours*—stone-colour, with several black vertical bands, mostly in the last half of the body; but in dirty water the black colour extends all over.

Habitat.—Ponds, rivers and ditches in the northern parts of Bengal, Behar, and along the Western ghants, attaining three inches in length: it is eaten by the natives.

Genus, 3—NANDUS, *Cuv. and Val.*

Bedula, Gray.

Branchiostegals six: pseudobranchiæ absent. Body oblong, compressed. Eyes lateral. Mouth very protractile, its cleft deep. Opercle with one spine: preopercle serrated, or more or less entire, as are also the preorbital, sub- and inter-opercles. Teeth villiform on the jaws, vomer, palatines and tongue: the length of the base of the spinous portion of the dorsal fin longer than that of the rays: anal with three spines. Scales of moderate size, ctenoid. Lateral-line interrupted. Air-vessel large and simple. Pyloric appendages absent.

Geographical distribution.—Fresh waters of India, Burma and Siam.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Nandus marmoratus*, D. $\frac{12-14}{11-13}$, A. $\frac{3}{7-9}$, L. l. 46-57. Brown, vertically marbled with wide darker bands.

This species shows great variation in accordance with the localities where it is taken, the serrations on the bones of the head being usually exceedingly indistinct or even absent in specimens obtained in Sind and India as far as Calcutta. But in Assam a considerable difference is perceptible, as most of the specimens have both limbs of the preopercle and also the lower edges of the sub- aud inter-opercles serrated, sometimes rather coarsely so.

1. Nandus marmoratus, Plate XXXII, fig. 1.

Coius nandus, Ham. Buch. pp. 96, 370, pl. 30, fig. 32; McClell. Cal. J. N. Hist. ii, p. 574.
Nandus marmoratus, Cuv. and Val. vii, p. 482, pl. 207; Cantor, Catal. p. 17; Jerdon, Madras J. L. and Sc. 1848, p. 141; Günther, Catal. iii, p. 367; Day, Fish. Malab. p. 128; Bleeker, Nandioides, p. 3.
Bedula Hamiltonii, Gray and Hardw. Ill. In. Zool. ii, pl. 88, f. 3 (from H. B. Ms.)
Mootahree, Mal.: *Bodosi* and *Gossiporah*, Ooriah: *Vuadhul*, Hind.: *Septi*, Tel.: *Latha* and *Gudtha*, Beng.: *Mussoassah*, Punj.: *Gad-gud-di* and *Bad-vaad-hi*, Assam.

B. vi, D. $\frac{12-14}{11-13}$, P. 16, V. 1/5, A. $\frac{3}{7-9}$, C. 15, L. l. 46-57, L. r. $\frac{50-68}{46-58}$, L. tr. $5\frac{1}{2}$-6/17-20, Vert. 24.

Length of head 1/3, of pectoral 2/15, of caudal 1/6 to 2/11, height of body 1/3 to 3/10 of the total length. *Eyes*—diameter 1/5 to 1/6 of length of head, rather above 1 diameter from end of snout, and 1 apart. The profile over the orbit is rather concave, whilst the abdominal is not so convex as that of the dorsal. Premaxillaries very protrusible, reaching to one diameter behind the posterior border of the orbit. The posterior extremity of the maxilla reaches to some distance behind the eye. Preopercle may be entire, only finely serrated at its angle, or serrated along both limbs: the sub- and inter-opercles likewise may be entire, serrated along their approximating portions or in their whole extent. Preorbital with some minute serrations or entire. *Teeth*—in villiform bands in the jaws, in an elongated band, widest at either extremity, on the tongue; in a narrow row on the palatines and in a Λ-shaped band on the vomer, in some cases "intermixed with these in each jaw are several sharp teeth of a larger size." (Ham. Buch. l. c.) *Fins*—dorsal spines rather strong, their base

occupying rather above three-fourths of the length of the fin and are receivable into a groove, interspinous membrane deeply emarginate, soft portion of the fin similar to that of the anal and almost square: anal spines of moderate strength the central one the longest and equal to two-thirds the length of the rays: caudal cut nearly square. *Scales*—rather smaller on the nape than on the body, some extend over the bases of the dorsal and anal rays, an enlarged one at the angle of the ventral fin and another between the two ventrals. *Lateral-line*—interrupted at about the 36th scale. *Colours*—greenish-brown with brassy reflections, vertically marbled with three broad patchy bands, and a fourth crosses the free portion of the tail, or occasionally there exists a black blotch there, some narrow dark bands radiate from the eye. Narrow bands of spots across the soft portions of the dorsal, anal, and the caudal fins.

In Assam and to the east of Bengal, as already observed (p. 129), the bones of the head are more strongly serrated than is usually seen in the other parts of India.

Bleeker has discriminated between the *Nandus marmoratus* C. V. of India, and the *N. nebulosus*, Gray and Hardw. which inhabits the islands of the Sound. Of this latter he observes amongst other peculiarities that its scales are $\frac{33}{31}$-$\frac{35}{32}$, being much fewer in number than in *N. marmoratus*. In examining 10 specimens of this latter I find as follows:

Five from Madras and Malabar L. r. $\frac{50}{47}$, $\frac{53}{51}$, $\frac{54}{46}$, $\frac{54}{50}$, $\frac{68}{58}$, L. tr. $5\frac{1}{2}$-6/17-20.
Five ,, Assam . . . . L. r. $\frac{54}{52}$, $\frac{56}{47}$, $\frac{57}{52}$, $\frac{57}{53}$, $\frac{62}{57}$, L. tr. $5\frac{1}{2}$-6/18-19.

Habitat.—Fresh and brackish waters of India and Burma, attaining at least 7 inches in length. It is common in ditches and inundated fields where it preys on small *Cyprinidæ*. It is exceedingly tenacious of life.

Genus, 4—Pristolepis, *Jerdon* (1848).

Catopra, Bleeker (1851): *Paranandus*, Day.

Branchiostegals six: pseudobranchiæ absent. Eyes lateral. Mouth moderately protractile. Opercle with two flat (generally bifid) spines: preopercle and preorbital mostly serrated. Teeth villiform on the jaws and palate, villiform or globular on the vomer, obtusely globular on the base of the tongue, on the roof of the cavity of the mouth (pre-sphenoid), and sometimes on the vomer. Anal fin with three or four spines. Scales ctenoid, large, extended on to the interbranchial membrane. Lateral-line interrupted. Pyloric appendages two.

Geographical distribution.—Fresh waters of the plains and hills of India, Burma, Siam and the Malay Archipelago: those with villiform teeth in the adult on the vomer would appear to belong to India proper: those with globular teeth on that bone to Burma and the Eastwards.

SYNOPSIS OF SPECIES.

A. *With villiform teeth on vomer (Paranandus).*

1. *Pristolepis marginatus*, D. $\frac{15-16}{11-12}$, A. $\frac{4}{8}$, preorbital, preopercle, sub- and inter-opercles serrated. Wynaad.
2. *Pristolepis Malabaricus*, D. $\frac{14}{12}$ $\frac{}{14}$, A. $\frac{3}{8}$. Malabar ghauts descending to the plains.

B. *With globular teeth on vomer (Catopra).*

3. *Pristolepis nandioides*, D. $\frac{12-13}{15-16}$, A. $\frac{3}{8}$. Burma and to the East as far as the Malay Archipelago.

A. *With villiform teeth on the vomer (Paranandus).*

1. Pristolepis marginatus.

Jerdon, Madras Journal, Lit. and Sc. 1848, p. 141, and Ann. and Mag. Nat. Hist. 1865, xvi, p. 298; Day, Fishes of Malabar, p. 131.

Catopra tetracanthus, Günther, Proc. Zool. Soc. 1862, p. 192, pl. xxvi, fig. B.

B. vi, D. $\frac{15-16}{11-12}$, P. 14, V. 1/5, A. $\frac{4}{8}$, L. r. $\frac{30}{27}$, L. tr. $3\frac{1}{2}$/11.

Length of head $3\frac{1}{3}$ to $3\frac{3}{4}$, of caudal 1/5, height of body, $3\frac{3}{4}$ in the total length. *Eyes*—diameter $3\frac{1}{2}$ to $3\frac{2}{3}$ of length of head, 1 diameter from end of snout, and 2/3 of a diameter apart. Length of head rather exceeds its height. Lower jaw very slightly the longer: premaxillaries reach to opposite the anterior margin of the orbit: the maxilla to below the front edge of the eye. Preopercle serrated at its angle and also for a short distance along its vertical border: sub- and inter-opercles likewise with some serrations at their approximating angles: opercle with two flat spines, the lower of which may be bifid: preorbital sometimes rather strongly serrated. *Teeth*—villiform in the jaws, with an outer rather widely placed row of curved ones: villiform teeth on the vomer and palatines, and granular at the root of the tongue and on the roof of the cavity of the mouth (pre-sphenoid). *Fins*—dorsal spines rather strong, increasing in length to the fifth: three last anal spines of about the same length: caudal rounded. *Scales*—two entire and two half rows between the lateral-line and the base of the dorsal fin: 13 rows between the base of the ventral and that of the dorsal fin. *Lateral-line*—interrupted opposite the last third of the soft dorsal on the twenty-first scale. *Colours*—as in the next species.

Habitat.—This form, originally described by Jerdon, was obtained from the "river of Manontoddy, flowing into the Cauvery: in the Cotiaddy river in North Malabar, and in the stream that runs near Canote in the same district." I have obtained one in Malabar $3\frac{3}{4}$ inches in length, with the *P. Malabaricus*. I

believe it to be rather an elongated variety of the next, but for the present leave them distinct. Dr. Jerdon felt so satisfied that the fish he described was the *Catopra Malabarica*, Günther, and I obtained so many specimens from Malabar, all but one however with merely three anal spines, that I accepted his opinion that a misprint had occurred. The two original specimens of *tetracanthus* are in the British Museum, having been received without any indication of their habitat from the E. I. Museum, it is therefore open to enquiry whether they might not be Jerdon's types. This fish is said to attain a considerably larger size than 4 inches in length.

2. Pristolepis Malabaricus, Plate XXXII, fig. 2.

Catopra Malabarica, Günther, Ann. and Mag. Nat. Hist. 1864, p. 375; Day, Proc. Zool. Soc. 1865, p. 30.
Nandus Malabaricus, Day, Fish. Mal. p. 130, pl. viii.
Chutichi, Mal.

B. vi, D. $\frac{14}{12-14}$, P. 14-15, V. 1/5, A. $\frac{3}{8}$, C. 16, L. l. 25-27, L. r. $\frac{27-29}{25-27}$, L. tr. $3\frac{1}{2}$/11, Vert. 13/11.

Length of head 4/13 to 1/4, of pectoral 1/4 to 2/9, of caudal 2/9, height of body 2/5 to 4/9 of the total length. *Eyes*—diameter 2/7 of length of head, 1 diameter from end of snout and also apart. Body compressed, a considerable rise to the dorsal fin: head as high as long: jaws equal in front; the premaxillaries reach posteriorly to opposite the first third of the orbit; the maxilla reaches to a little behind the front edge of the eye. Preopercle with its vertical limb roughened, in some cases serrated, most strongly so at its angle: sub- and inter-opercles with some fine serrations at their approximating portions. Opercle with two sharp flat spines which are generally bifid: preorbital entire. *Teeth*—villiform in the jaws, with the outer row somewhat enlarged, some specimens have merely two or four teeth enlarged in the lower jaw, and standing rather in front of the remainder: vomer and palatines with small villiform teeth; the presphenoid has small teeth, all but the outer row of which have rounded crowns, and there are some of the same description at the root of the tongue on the epi- and cérato-hyals, those on the cerato-hyal having rounded crowns, the outer row being somewhat smallest and pointed, they do not extend so far forwards as in the *P. nandioides*, neither are the middle ones so large: villiform teeth on both superior and inferior pharyngeals. *Fins*—dorsal spines rather stout, shorter than the rays, increasing in length to the third and having a groove for their reception along their base, interspinous membrane somewhat deeply emarginate: second anal spine thickest but not quite so long as the third, a groove along their base: caudal rounded. *Lateral-line*—interrupted, ceasing opposite the fourth ray on the twenty-first scale, commencing again in the centre of the side below the last ray, there are two entire and two half rows between the lateral-line and base of the dorsal fin, and 13 between the ventral and base of the dorsal. *Colours*—rifle-green with purplish reflections, fins with lighter edges: caudal with a white outer margin. In some specimens the fish is vertically banded.

Habitat.—Ghauts of Western India, where it seems to prefer clear and rapid streams, attaining at least 6 inches in length.

B. *With globular teeth on the vomer (Catopra).*

3. Pristolepis fasciatus, Plate XXXII, fig. 3.

Catopra fasciata, Bleeker, Borneo, p. 65, and Nandioides, p. 7, fig. 2; Günther, Catal. iii, p. 368.
Catopra nandioides, Bleeker, Sclerop. &c. 1851, p. 172; Günther, Catal. iii, p. 368; Day, Proc. Zool. Soc. 1869, p, 615.
Catopra Siamensis, Günther, Proc. Zool. Soc. 1862, p. 191, pl. xxvi, fig. A.

B. vi, D. $\frac{12-13}{14-16}$, P. 15, V. 1/5, A. $\frac{3}{8}$, C. 14, L. l. 26-28, L. r. $\frac{30}{28}$, L. tr. $4\frac{1}{2}$/12, Cæc. pyl. 2.

Length of head from 4/13 to 4/15, of pectoral 1/5, height of body $2\frac{1}{4}$ to $2\frac{1}{2}$ in the total length. *Eyes*—diameter nearly 1/4 of length of head, 1 diameter from end of snout, and $1\frac{1}{2}$ apart. Head as high as long. Snout in the adult convex; body oblong, compressed, the dorsal profile rising considerably to the base of the dorsal fin. The maxilla reaches to below the first third of the orbit. Preorbital and preopercle rather strongly serrated; fine serrations, which may be absent, on the contiguous portions of the sub- and inter-opercles: two sharp flat spines on the opercle, mostly bifid, and the lower the larger. *Teeth*—villiform in jaws and palatines, globular on vomer, base of tongue and roof of the cavity of the mouth, at the base of the tongue they extend forward nearly to its anterior extremity. In the young, *C. Siamensis*, the vomerine teeth are not quite so blunted as they become in the adult. *Fins*—dorsal spines strong, interspinous membrane deeply emarginate, central rays the longest: second anal spine the strongest but not so long as the third: caudal rounded. *Lateral-line*—interrupted opposite the posterior end of the dorsal fin, being continued on the third row of scales below it. *Air-vessel*—large. *Scales*—four entire rows between the lateral-line and base of the dorsal fin, and 16 or 17 between the bases of the ventral and dorsal. *Cæcal appendages*—two. *Colours*—dull greenish, having a deep black spot in the axilla and over the upper part of the base of the pectoral fin, which otherwise is yellow: the other fins slate coloured.

Four specimens were procured in Burma varying from $4\frac{3}{10}$ to 8 inches in length. A small one from Prome had only 12 dorsal spines, but otherwise no difference was perceptible. Two from Sittang had each 13 spines: the immature is banded. I have likewise a specimen $3\frac{1}{2}$ inches long from Siam, collected by Dr. v. Mertens, its opercular spines are not bifurcated.

Habitat.—Fresh-waters of Burma, Siam, and the Malay Archipelago.

Family, V—SPARIDÆ, *Cuv.*

Squamipinnes, pt. Cuv.: *Chætodontidæ*, pt. Richards.

Branchiostegals from five to seven: pseudobranchiæ well developed. Body oblong and compressed. Eyes of moderate size, lateral. Mouth in front of snout, having a lateral cleft. Bones of the head with a rudimentary muciferous system. No teeth on the palate (except in Genus *Pimelepterus*): more or less broad and cutting or conical teeth in front of the jaws, or a lateral series of molars, or both conjoined. A single dorsal fin formed by a spinous and soft portion, their bases being of nearly equal extent; anal with three spines: lower pectoral rays generally branched, but not so in some genera: ventrals thoracic, with one spine and five rays. Lateral-line continuous, not extending on to the caudal fin. Scales cycloid or minutely ctenoid.

Geographical distribution.—Seas of temperate and tropical regions, some entering fresh waters.

SYNOPSIS OF GENERA.

First group—Cantharina.

Broad cutting teeth in front of the jaws: no molars: palate edentulous. Lower pectoral rays branched.

1. *Crenidens.* One or more rows of broad cutting teeth and with a posterior band of granular ones: no pointed lateral tooth. Scales on cheeks and opercles, none on the vertical fins.

Second group—Sargina.

Cutting teeth in front of jaws: no molars. Lower pectoral rays simple.

2. *Sargus.* Molar teeth in several rows along the sides of the jaws.

Third group—Pagrina.

Cutting teeth in front of the jaws and molars along the sides.

3. *Lethrinus.* No scales on the cheeks.
4. *Sphærodon.* Scales on cheeks. Canine teeth and a single row of molars.
5. *Pagrus.* Scales on cheeks. Canine teeth, two rows of molars in the upper jaw.
6. *Chrysophrys.* Scales on cheeks. Canine teeth, three or more rows of molars in the upper jaw.

Fourth group—Pimelepterina.*

Cutting teeth in front of the jaws, and teeth on the palate.

Pimelepterus, as defined above.

First group—Cantharina.

Broad cutting teeth in front of the jaws: no molars: palate edentulous. Lower pectoral rays branched.

Genus, 1—Crenidens, *Cuv. and Val.*

Branchiostegals five: pseudobranchiæ. One or two rows of broad teeth in both jaws, with their cutting edges crenulated: a band of granular teeth posteriorly but no pointed lateral ones: neither molars nor vomerine teeth. A single dorsal with eleven spines which can be received into a groove: three anal spines: lower pectoral rays branched. Scales ctenoid, of moderate size, covering cheeks and opercles, but not the vertical fins. Air-vessel simple. Pyloric appendages in small numbers.

Geographical distribution.—Red Sea, coasts of Africa, seas of India to the Malay Archipelago and beyond.

SYNOPSIS OF SPECIES.

1. *Crenidens Indicus*, D. $\frac{10-12}{11-10}$, A. $\frac{3}{10-11}$, L. l. 53-57, L. tr. 7/13, Cæc. pyl. 5. Dorsal spines very strong. Greyish, fins black. Red Sea and seas of India.

2. *Crenidens Forskälii*, D. $\frac{11}{11}$, A. $\frac{3}{9-11}$, L. l. 52-54, L. tr. 5/15, Cæc. pyl. 3. Dorsal spines comparatively weak. Silvery, fins grey. Red Sea and seas of India.

1. Crenidens Indicus, Plate XXXII, fig. 4.

Day, Report on the Sea Fish and Fisheries of India, Nov. 15th, 1873, p. clxxxvi, No. 184.
? *Crenidens Forskälii*, Kner, Novara Fische, p. 74.

* Klunzinger, in his elaborate paper on the Fishes of the Red Sea, considers this group as distinct from the *Sparidæ*.

Crenidens macracanthus, Günther, Ann. and Mag. Nat. Hist. Nov. 1874, p. 368.
Keen-see, Belooch.: *Oolan*, Tam.

B. v, D. $\frac{10-12}{11-10}$, P. 15, V. 1/5, A. $\frac{3}{10-11}$, C. 17, L. l. 53-55, L. tr. 7/13, Cæc. pyl. 5.

Length of head 1/4 to 2/9, of caudal about 1/5, height of body 4/11 to 1/4 of the total length. *Eyes*—diameter 2/7 to 1/3 of length of head, 1 to $1\frac{1}{3}$ diameters from end of snout, and 1 apart. Form of body oval and compressed: a slight swelling above the eyes. The maxilla reaches to below the front edge of the orbit. Preorbital broad, scaleless, occasionally notched on its lower margin to receive the extremity of the maxilla. Opercle with a soft point. *Teeth*—a compressed row in the front of either jaw, eight in the upper, each being lobed at the sides, behind this row are three more of the same character but smaller in size and more in number; in large specimens there may be some with rounded crowns in the inner row: in the mandible there are ten in the front row smaller in size than those in the upper jaw each having about five notches, behind these are two or three rows as in the upper jaw. *Fins*—dorsal spines strong, the fourth which is the longest, equalling 2/5 to 1/3 in the height of the body, they are alternately wider on one side. Pectoral extending to above the base of the anal: second anal spine strong and nearly or quite as long as the fourth of the dorsal, the third which is weaker, is of about equal length: caudal emarginate. *Scales*—two or three rows on the cheeks, $6\frac{1}{2}$ or 5 entire and 2 half rows between the lateral-line and sixth dorsal spine, 17 rows between snout and base of dorsal fin, and 9 or 10 between base of ventral and lateral-line. *Colours*—greyish-silvery, the scales on the head and anterior portion of the body with black edges, dark lines along the rows on the body: dorsal and anal fins black except the last anal ray which is white: pectoral yellow, with its base orange, and a black spot in axilla: outer two-thirds of ventral black, the rest bluish-white: caudal dark grey with a black edge.

Habitat.—Very common along the Sind coast and not rare at Madras: attaining at least 12 inches in length. Also found at Suez. The specimen figured is from Sind and 10 inches long.

2. Crenidens Forskälii.

Sparus crenidens, Forsk. Desc. Anim. p. xv, No. 19.
Crenidens Forskälii, Cuv. and Val. vi, p. 377, pl. 162 quater; Rüppell, N. W. Fische, p. 120; Peters, Wieg. Arch. 1855, p. 243; Günther, Catal. i, p. 424.

B. v, D. $\frac{11}{11}$, P. 15, V. 1/5, A. $\frac{3}{9-11}$, C. 17, L. l. 52, L. tr. 5/15, Cæc. pyl. 3.

Length of head $4\frac{1}{2}$ to $4\frac{3}{4}$, of caudal 4/21 to 1/5, height of body $2\frac{3}{4}$ of the total length. *Eyes*—diameter 2/7 of length of head, 1 diameter from end of snout, and also apart. A swelling over the anterior-superior angle of the eye. The maxilla reaches to below the anterior nostril. Preorbital two-thirds as high as the orbit is wide. *Teeth*—in a compressed row in front of either jaw as in the last species *(C. Indicus)*, but with ten in the anterior row in the upper and twelve in the lower jaw. *Fins*—dorsal spines rather weak, with the fourth slightly the longest, and rather less than half the length of the head: pectoral much longer than the head, but not reaching to above the anal spines, which latter are weak, the third being equal to two-thirds of the length of the fourth dorsal spine, and not quite so strong as the second: caudal forked. *Scales*—11 or 12 rows between the base of the ventral fin and the lateral-line, and $5\frac{1}{2}$ or four entire and two half rows between the lateral-line and base of the sixth dorsal spine. *Colours*—silvery, the vertical fin being rather darker than the body.

Habitat.—Red Sea, seas of India, Sind, and the coast of Mozambique.

Second group—Sargina.

Cutting teeth in front of jaws: no molars. Lower pectoral rays branched.

Genus, 2—Sargus, *(Klein)*, *Cuv.*

Branchiostegals five or six: pseudobranchiæ. Opercle either unarmed or with a blunt point. A single row of cutting teeth in the front part of the jaws, and several lateral rows of rounded molars. A single dorsal with from ten to thirteen spines receivable into a groove along its base: anal with three. Scales finely ctenoid, of moderate size, covering the cheeks. Air-vessel sometimes notched anteriorly and posteriorly. Pyloric appendages few.

Geographical distribution.—This genus has a wide range, being found in the Mediterranean, Atlantic, and the Western shores of India.

SYNOPSIS OF INDIVIDUAL SPECIES.

Sargus noct. D. $\frac{12}{13-14}$, A. $\frac{3}{13}$, L. l. 62-68, L. tr. 6/16. Eight flattened and compressed incisors in either jaw. A black spot on the lateral-line on either side of the tail. Red Sea, Beloochistan and Sind.

1. Sargus noct. Plate XXXII, fig. 5.

(Ehren.) Cuv. and Val. vi, p. 51: Rüppell, N. W. Fische, p. 110; Günther, Catal. i, p. 444; Klunz. Verh. z. b. Ges. Wien, 1870, p. 81.
Keen-see, Belooch.

B. vi, D. $\frac{12}{13-14}$, P. 15, V. 1/5, A. $\frac{3}{13}$, C. 17, L. l. 62-68, L. tr. 7-8/16, Cæc. pyl. 8 (5), Vert. 10/13.

Length of head 1/4 to 2/9, of caudal 1/5, height of body 3/10 of the total length. *Eyes*—diameter 1/3 to 1/4 of the length of head, $1\frac{1}{4}$ to $1\frac{1}{2}$ diameters from end of snout, and also apart. Dorsal and abdominal

profiles about equally convex. The maxilla reaches to below the front edge of the orbit: snout compressed, lips rather thick. The height of the preorbital equals two-thirds of the diameter of the orbit, preopercle and preorbital entire: opercle with a blunt point. *Teeth*—eight broad, compressed, rather forwardly directed incisors in either jaw, also three rows of rounded molars. *Fins*—dorsal spines of moderate strength, increasing in length to the fourth, which equals about half of that of the head, the rays much lower than the spines. Pectoral as long as the head; ventral does not reach the anus: second anal spine strongest and longest, equalling the length of the snout: caudal forked, the upper lobe usually the longer. *Scales*—five rows between the eye and the angle of the preopercle. *Colours*—greyish-silvery, fine dots on the scales, forming lines along the centre of each row, and a darkish spot at the base of the pectoral: a black blotch with a silvery lower border (lost in the adult) on the lateral-line between the end of the dorsal fin and the base of the caudal. *Fins*—blackish, except the pectoral, which is flesh-coloured, and the caudal which has an orange tinge. Eyes golden. *Young* with narrow vertical brown lines on the body.

Habitat.—Red Sea, very common at Suez, to the coast of Sind, attaining at least 12 inches in length.

Third group—Pagrina.

Cutting teeth in front of the jaws and molars along the sides.

Genus, 3—Lethrinus, *Cuv.*

Branchiostegals six: pseudobranchiæ. Villiform teeth in the anterior portion of the jaws, having canines in front of them: lateral teeth in a single row and either conical or with rounded crowns: none on the palate or tongue. Dorsal fin single, receivable into a sheath at its base, and having ten spines and nine rays: anal with three spines. Scales of moderate size, none on the cheeks. Air-vessel generally notched posteriorly and having short lateral processes. Pyloric appendages few.

Bleeker in his revision of the fishes of this genus offers some excellent remarks. The *Lethrini* have the same number of spines and rays, whilst the number of pierced scales along the lateral-line only varies between about 45 and 50, and the scaling of the head is the same in all. One would imagine that specific characters might be found in the length of the snout, in the comparative height of the preorbital, and in the form of the posterior teeth in the jaws, but these characters have merely a relative value, because the snout becomes more elongated as age advances, the height of the preorbital increases, and the rounded molars in the adult are occasionally the remains of what were conical and pointed teeth in the young. The same variations are seen as to colours, the black lateral blotch present in the young disappears in some species as age advances, in fact the vivid colours of immature become more sober and uniform as age increases. The best characteristics are found in the number of rows of scales between the lateral-line and the dorsal fin, in the form of the profile: in the relative heights of the body and head, and in the strength and length of the dorsal and anal spines.

Geographical distribution.—Red Sea, East coast of Africa, seas of India, to the Malay Archipelago and beyond.

SYNOPSIS OF SPECIES.

A. *With the lateral teeth conical.*

1. *Lethrinus rostratus*, D. $\frac{10}{9}$, A. $\frac{3}{8}$, L. tr. 6/16. Height of body 1/4 of the total length: eyes 2 to $2\frac{1}{2}$ diameters from end of snout. Fourth dorsal spine longest. Olive-brown, with dark bands on the head, and generally a dark blotch between the pectoral fin and lateral-line. Red Sea, seas of India to the Malay Archipelago and beyond.

B. *With some or all of the lateral teeth molarform.*

2. *Lethrinus cinereus*, D. $\frac{10}{9}$, A. $\frac{3}{8}$, L. tr. 6/17. Head slightly longer than high. A quadrangular blotch between the pectoral fin and the lateral-line. Seas of India.
3. *Lethrinus karwa*, D. $\frac{10}{9}$, A. $\frac{3}{8}$, L. tr. 6/17. Head rather higher than long. A blue spot on each scale, a blood red edge to opercle. Seas of India.
4. *Lethrinus nebulosus*, D. $\frac{10}{9}$, A. $\frac{3}{8}$, L. tr. 6/16. Head rather longer than high: eyes $2\frac{1}{2}$ diameters from end of snout. Bands of blue and yellow spots. Red Sea and Indian Ocean.
5. *Lethrinus opercularis*, D. $\frac{10}{9}$, A. $\frac{3}{8}$, L. tr. 6/16. Colours as in *karwa*. Seas of India.
6. *Lethrinus ornatus*, D. $\frac{10}{9}$, A. $\frac{3}{8}$, L. tr. 6/15. Head as high as long. Eyes $1\frac{1}{2}$ diameters from end of snout. Several longitudinal bands and a violet one across the base of the pectoral fin. Andamans to the Malay Archipelago.
7. *Lethrinus ramak*, D. $\frac{10}{9}$, A. $\frac{3}{8}$, L. tr. 6/14. Head longer than high. Eyes 2 diameters from end of snout. Olive, with yellowish bands and a violet spot in the axilla. Red Sea and Ceylon.
8. *Lethrinus harak*, D. $\frac{10}{9}$, A. $\frac{3}{8}$, L. tr. $5\frac{1}{2}$/15. Eyes 2 diameters from end of snout. Head as high as long. An oblong black blotch below the lateral-line opposite the middle of the pectoral fin. Red Sea and seas of India.

A. *With the lateral teeth conical.*

1. Lethrinus rostratus, Plate XXXIII, fig. 1.

(Kuhl. and v. Hass.) Cuv. and Val. vi, p. 296; Bleeker, Verh. Bat. Gen. xxiii, Spar. p. 13 and Révis. Leth. p. 26; Günther, Catal. i, p. 454.

Lethrinus longirostris, Playfair, Fish. Zanz. p. 44, pl. vii, fig. 2.

B. vi, D. $\frac{10}{9}$, P. 13, V. 1/5, A. $\frac{3}{8}$, C. 19, L. l. 48-50, L. tr. 6/16, Cæc. pyl. 3.

Length of head 3/11, of caudal 1/5, height of body 1/4 of the total length. *Eyes*—diameter 1/5 of length of head, $2\frac{1}{2}$ diameters from end of snout, and $1\frac{1}{4}$ apart. Interorbital space nearly flat: snout pointed and compressed. Length of head 1/4 more than its height. The maxilla reaches to nearly below the front nostril. *Teeth*—three rather small curved canines in front of the upper jaw, and a small one on either side of the symphysis of the lower jaw: from 18 to 20 compressed, conical, and pointed teeth along either ramus of the lower jaw, and about 15 similar ones in the upper, the most posterior of these last being occasionally a little rounded. *Fins*—dorsal spines rather weak, increasing in length to the fourth which equals one third of the height of the body or the postorbital length of the head, but is not quite so long as the rays: pectoral as long as the head, exclusive of its postorbital portion: ventral almost reaches the anal spines, the third of which is considerably longer than the second: caudal emarginate. *Scales*—four entire and 2 half rows between the lateral-line and base of sixth dorsal spine. *Colours*—olive-brown lightest on the abdomen. Head, more especially superiorly, having a tinge of purple: a dark brown blotch behind the posterior superior angle of the eye: three narrow dark bands pass from the anterior edge of the eye to the upper jaw: a fourth along the inferior and hind edge of the eye: an oblique one commences on the opercle and crosses to the angle of the mouth becoming very faint in its last portion: a large blotch on the opercle. Inside of mouth orange. The centre of each scale having a blue spot, darkest externally: about eight faint vertical bands descend from the back towards the middle of the body, and usually a dark blotch is apparent between the pectoral fin and the lateral-line. A black spot at the base of each dorsal ray and the fin lightly banded: ventrals slate-coloured: some indistinct vertical bands on the caudal.

L. korely, C. V. vi, p. 292, is said to be closely allied and very similar to *L. frœnatus*, C. V., the first has the teeth larger and more rounded, and only two streaks between the end of the mouth and the eye. Its back is vinous brown, abdomen white and the dorsal spotted with red. The eye in the latter is only 1/3 the length of the head, rather above 1 diameter from the end of snout, and nearly 1 apart: the height of the body is about 1/3 of the total length, but the specimen is only about $4\frac{1}{2}$ inches in length.

The specimen figured was captured at Bombay and is 12 inches long.

Habitat.—Red Sea, through those of India to the Malay Archipelago and beyond.

B. *With some or all the lateral teeth molarform.*

2. Lethrinus cinereus.

Cuv. and Val. vi, p. 293.
? *Lethrinus maculatus*, Cuv. and Val. vi, p. 292.

B. vi, D. $\frac{10}{9}$, P. 13, V. 1/5, A. $\frac{3}{8}$, C. 17, L. l. 47-48, L. tr. 6/17.

Length of head 3/11, of caudal 3/17, height of body 1/3 to 4/13 of the total length. *Eyes*—diameter 2/7 to 1/4 of length of head, $1\frac{1}{2}$ diameters from end of snout, and nearly 1 apart. Interorbital space nearly flat. The height of the head nearly equals its length. The maxilla, 1/3 the length of the head, reaches to beneath the front nostril. Opercle with two points separated by a shallow emargination, the lower being the larger. *Teeth*—four small curved canines in the upper and six in the lower jaw, the lateral teeth conical and somewhat irregular in size, especially in the lower jaw, the posterior ones of which have rounded crowns. *Fins*—dorsal spines of moderate strength, increasing in length to the fourth and fifth which equal about 1/3 of the height of the body. Pectoral nearly as long as the head: ventral reaches the vent: second and third anal spines of moderate strength, of about equal length and as high as the third of the dorsal fin, highest anal ray not equal to the length of the base of the rays: caudal forked, lobes pointed. Free portion of the tail as high or higher at its commencement as it is long. *Scales*—5 entire and 2 half rows between the lateral-line and the base of the dorsal fin. *Colours*—of an olive brown, having a quadrangular black blotch between the pectoral fin and the lateral-line: faint vertical bands on the body which are more or less broken up: numerous white or blue spots on the scales in the upper half of the first two-thirds of the body: dorsal fin with brown spots and a red outer margin: pectoral pinkish: ventral slate-coloured: anal similar to the second dorsal: caudal with 3 faint brown vertical bands most distinct in the young.

Habitat.—Seas of India, to the Malay Archipelago and beyond: my longest specimen is 9 inches and from Madras.

3. Lethrinus karwa, Plate XXXIII, fig. 2.

Sparus karwa, Russell, i, p. 71, pl. 89.
Lethrinus karwa, Cuv. and Val. vi, p. 311; Day, Proc. Zool. Soc. 1867, p. 558.
? *Sparus korely*, Cuv. and Val. vi, p. 292.
Karwa, Tel.

B. vi, D. $\frac{10}{9}$, P. 13, V. 1/5, A. $\frac{3}{8}$, C. 17, L. l. 48, L. tr. 6/17.

Length of head 2/7 to $3\frac{3}{4}$, of caudal 1/6, height of body 2/7 of the total length. *Eyes*—diameter in the adult at 15 inches 1/4 to $4\frac{1}{4}$ of length of head, $2\frac{1}{2}$ diameters from end of snout, and 1 apart. Head rather higher than long. Interorbital space nearly flat: the maxilla ($2\frac{3}{4}$ in the length of the head) reaches to below the front nostril. Preopercle very oblique in adults: opercle with two blunt points separated by a somewhat

deep emargination. *Teeth*—four large and strong canines in either upper jaw, and the same number in the lower, the outer of which are the largest, in the adult all the lateral row of teeth in the upper jaw with rounded crowns, increasing in size to the last but two; in the lower jaw the first five of the teeth are more or less conical and rounded, whilst those behind have rounded crowns widest transversely except the last two. In younger specimens the posterior teeth are not so rounded. *Fins*—dorsal spines of moderate strength increasing in length to the third, which equals rather more than $1\frac{1}{2}$ diameters of the orbit in height and scarcely so long as the longest ray, it is longer than the fourth. Pectoral nearly as long as the head: ventral reaches the vent: second anal spine rather strongest but not so long as the third, which equals the length of the second of the dorsal fin, and is nearly as high as the rays, the longest of which does not equal that of the base of the soft portion of the fin: caudal emarginate. *Scales*—$5\frac{1}{2}$ or 4 entire and 2 half rows between the lateral-line and the base of the spinous dorsal fin. *Colours*—olivaceous-brown becoming lighter on the abdomen, the centre of each scale having a cobalt-blue spot forming longitudinal lines in the direction of the rows of scales, in some specimens there are intermediate yellow bands: inside of mouth orange: pectoral flesh-coloured, base of its second ray bright blue: dorsal, caudal and anal slate-coloured, margined with orange, and having a line of spots along the centre of the rays; ventral externally slate-coloured. In most adult specimens a faint quadrangular spot is seen between the lateral-line and the middle of the pectoral fin and indistinct vertical bands. In some the edge of the opercle, sub-opercle and branchiostegous rays is of a blood-red colour, but this colour is likewise seen in some specimens of *L. nebulosus*.

Habitat.—Red Sea, seas of India: the specimen figured was captured at Madras in June, 1867, and is 16 inches in length.

4. Lethrinus nebulosus, Plate XXXIII, fig. 4.

Sciæna nebulosa, Forsk. p. 52.

Lethrinus nebulosus, Cuv. and Val. vi, p. 284; Rüpp. N. W. Fische, p. 118; Günther, Catal. i, p. 460; Klunz. Fische d. Roth. Meer. Verh. z. b. Ges. Wien, 1870, p. 86.

B. vi, D. $\frac{10}{9}$, P. 13, V. 1/5, A. $\frac{3}{8}$, C. 17, L. l. 46-48, L. tr. 6/16.

Length of head 3/11 to 2/7, of caudal 1/6 to 2/11, height of body 3/11 to 2/7 of the total length. *Eyes*—diameter 1/4 to 2/9 of length of head, 2 to $2\frac{1}{2}$ diameters from end of snout, and 1 apart. Height of the head rather less than its length. Interorbital space nearly flat, dorsal profile not much elevated. The maxilla, $2\frac{2}{3}$ in the length of the head, reaches to beneath the front nostril. Numerous fine open pores on the lower surface of the mandibles, and even on to the cheeks in the adult. Preopercle moderately oblique: opercle with two blunt points, separated by a shallow emargination. *Teeth*—four rather small canines in the front of either jaw, the first three of the lateral teeth in the upper jaw rather conical, the remainder with globular crowns, not wider transversely than in their antero-posterior diameter: the first six or seven lateral teeth in the lower jaw rather conical, the remainder with globular crowns and rather larger than in the upper jaw. *Fins*—dorsal spines of moderate strength, increasing in length to the fourth which equals rather more than $1\frac{1}{2}$ diameters of orbit in height, and is about equal to the longest ray. Pectoral nearly as long as the head: ventral reaches the anus: second anal spine nearly one-fourth shorter than the third which is nearly as long as the third of the dorsal fin, and as high as the anal rays, the highest of which last equals the length of the bases of the rays: caudal forked, lobes pointed. *Scales*—the row containing the lateral-line rather smaller than the one above or below it: five entire and two half rows between the lateral-line and base of the dorsal fin. Free portion of the tail about as long as high at its base. *Colours*—a blue, black-edged band passes from the eye to the posterior nostril, a second to the angle of the mouth: another blue line exists below the eye: preopercle spotted with blue. Inside of the mouth orange: opercular membrane yellow, sometimes blood-red. Body olivaceous, becoming lighter on the abdomen: scales orange along their centres, and every other row spotted with blue at its base: in some specimens faint vertical bands are perceptible, and a darkish blotch between the pectoral fin and the lateral-line, whilst the rows of scales below the pectoral have a narrow dark line along their centres. A large specimen had a cobalt blue band over the last half of the eye, whilst the last row of occipital scales was of the same colour: upper surface of the head tinged with blue. Dorsal, caudal and anal slate-coloured, the dorsal edged with reddish, and having two rows of blue spots: faint lines along the soft dorsal and anal, the caudal with narrow blue transverse bars: upper pectoral ray blue in its basal half.

The specimen figured was captured at Aden: my longest specimen is from Sind, and $16\frac{1}{2}$ inches in length.

Lethrinus centurio,* C.V. has the height of the body about 1/3 of the total length. *Eyes*—in the commencement of the last half of the head, $2\frac{1}{4}$ diameters from end of snout, and $1\frac{1}{2}$ apart. Height of head 1/4 more than its length.

Habitat.—Red Sea and the seas of India: very common at Madras.

5. Lethrinus opercularis.

Cuv. and Val. vi, p. 289: Bleeker, Verh. Bat. Gen. xxiii, Spar. p. 14, Révis. Leth. p. 20; Günther, Catal. i, p. 463.

? *Lethrinus geniguttatus*, Cuv. and Val. vi, p. 304.

* *Lethrinus centurio*, C.V. vi, p. 301; Peters, Wieg. Arch. 1855, p. 243.
Lethrinus esculentus, C.V. vi, pl. 158.

B. vi, D. $\frac{10}{9}$, P. 13, V. 1/5, A. $\frac{3}{8}$, C. 17, L. l. 48, L. tr. 6/16.

Length of head 2/7, of caudal 2/11, height of body 2/7 of the total length. *Eyes*—diameter 1/4 of length of head, $1\frac{3}{4}$ diameters from the end of snout, and 1 apart. *Teeth*—as in *L. nebulosus*. *Fins*—as in *L. nebulosus*, except that the second anal spine is nearly as long as the third, equals one diameter of the eye in length, and is not quite so long as the second in the dorsal fin. *Colours*—as in *karwa*.

Habitat.—Seas of India and ? Malay Archipelago.

6. Lethrinus ornatus.

Cuv. and Val. vi, p. 231; Bleeker, Révis. Lethr. p. 18.

Lethrinus erythrurus, Cuv. and Val. vi, p. 293 (young).

Lethrinus xanthotænia, Bleeker, Sclerop. 1851, ii, p. 176; Günther, Catal. i, p. 461.

B. vi, D. $\frac{10}{9}$, P. 13, V. 1/5, A. $\frac{3}{8}$, C. 17, L. l. 48, L. tr. 6/15.

Length of head 4/15, of caudal nearly 1/5, height of body nearly 1/3 (4/13) of the total length in a specimen 7 inches long. *Eyes*—diameter 2/7 of length of head, $1\frac{1}{2}$ diameters from end of snout, and nearly 1 apart. Interorbital space nearly flat: dorsal profile somewhat elevated. Height of head equals its length. The maxilla is nearly 1/3 the length of the head, and reaches to almost below the front edge of the orbit. Preopercle scarcely oblique: opercle with two blunt points, separated by a very shallow emargination. *Teeth*—four conical canines in either jaw, the first five lateral teeth in the upper jaw conical and pointed, the remainder with globular crowns: the first five in the lower jaw similar to those in the upper but smaller, the posterior ones of moderate or rather small size and with rounded crowns. *Fins*—dorsal spines of moderate strength, increasing in length to the fourth which is the highest, as long as the longest ray, and equal to about 1/3 of the height of the body below it. Pectoral almost as long as the head: ventral reaches the anus: second anal spine rather stronger but shorter than the third which equals the length of the third of the dorsal fin, and is nearly as high as the rays, the height of which equals the length of the base of the soft portion of the fin: caudal forked. *Scales*—the row containing the lateral-line is much smaller than that above or below it. *Colours*—greenish-olive, with from six to seven yellow horizontal bands: the opercular membrane red, caudal edged with red. A violet band across the base of the pectoral fin.

Young specimens have the dorsal and anal edged with reddish, and irregular blackish blotches about the body, the largest, which is somewhat quadrangular, being above the middle of the base of the pectoral fin.

Habitat.—Andamans to the Malay Archipelago.

7. Lethrinus ramak.

Sciæna ramak, Forsk. p. 52.

Lethrinus ramak, Rüpp. N. W. Fische, p. 117, t. 28, f. 3; Günther, Catal. i, p. 459; Klunz. Fische d. Roth. Meer, Verh. z. b. Ges. in Wien, 1870, p. 752.

Lethrinus fasciatus, Cuv. and Val. vi, p. 290.

? *Lethrinus Ehrenbergii*, Cuv. and Val. vi, p. 312.

B. vi, D. $\frac{10}{9}$, P. 13, V. 1/5, A. $\frac{3}{8}$, C. 17, L. l. 50, L. tr. 6/14.

Length of head $3\frac{2}{3}$, of caudal 1/5 to $5\frac{1}{4}$, height of body $3\frac{1}{3}$ in the total length. *Eyes*—diameter 1/4 to $4\frac{1}{4}$ in the length of head, 2 diameters from end of snout, and $1\frac{1}{4}$ apart. Interorbital space slightly convex from side to side. Height of head a little less than its length. The length of the maxilla is $2\frac{2}{3}$ in that of the head, it reaches to beneath the posterior nostril. Fine pores visible over most of the scaleless portion of the head. *Teeth*—canines rather small, the lateral row in the jaws are first compressed and pointed, the posterior 6 or 8 being rounded, the first few of which are largest and most obtuse. *Fins*—dorsal spines of moderate strength, increasing in length to the third and fourth, which equal one-third of the height of the body, but are not quite so long as the last rays. Pectoral nearly as long as the head: ventral reaches the anus. Second anal spine strongest but not so long as the third which eqnals the second in the dorsal fin: the longest ray not quite equal to the extent of the base of the soft portion: caudal forked. *Scales*—$5\frac{1}{2}$ or 4 entire and 2 half rows between the lateral-line and the base of the spinous dorsal. Free portion of the tail as high at its base as it is long. *Colours*—olive, with yellow longitudinal bands, a small violet spot in the axilla.

The canines in front of the jaws in Cuv. and Val.'s specimens are rather larger than described above, whilst a brown spot exists below the lateral-line above the first third of the pectoral fin.

Habitat.—Red Sea and Ceylon.

8. Lethrinus harak, Plate XXXIII, fig. 3.

Sciæna harak, Forsk. p. 52.

Lethrinus harak, Rüpp. N. W. Fische, p. 116, t. 29, f. 3; Bleeker, Spar. p. 15 and Révis. Lethr. p. 21; Günther, Catal. i, p. 458; ? Kner, Novara Fische, p. 81; ? Klunz. Fisch. R. M. Verh. z. b. Ges. Wien, 1870, p. 755.

Lethrinus rhodopterus, Bleeker, Singapore, p. 65.

? *Lethrinus Amboinensis*, Kner, Novara Fische, p. 80 (not Bleeker).

? *Lethrinus Banhamensis*, Garrett's Fische d. Sudsee, t. xlvii.*

* Dr. Günther's description has not yet been published, it appears, from the figure, as if the species had only $4\frac{1}{2}$ rows of scales between the lateral-line and the base of the 6th dorsal spine, thus agreeing with Klunzinger's description.

Po-tang-dah, Andam.

B. vi, D. $\frac{10}{9}$, P. 12, V. 1/5, A. $\frac{3}{8}$, C. 17, L. l. 46-47, L. tr. $5\frac{1}{2}$/15, Cæc. pyl. 3.

Length of head 3/11, of caudal 2/11, height of body 2/7 of the total length. *Eyes*—diameter $3\frac{1}{4}$ to 1/4 in length of head, rather above 2 diameters from end of snout, and 1 apart. Height of head nearly equals its length. Snout rather elongated and pointed, having a slight swelling above the anterior superior edge of the eye. The maxilla reaches to below the front nostril. *Teeth*—canines in front of the villiform bands in both jaws, and of moderate size; the first four in the lateral row conically obtuse, whilst the hind ones are large and rounded. *Fins*—dorsal spines weak, increasing in length to the fourth which equals one-third of that of the body below it, or $2\frac{3}{4}$ in the length of the head, and is about equal to the length of the rays. Pectoral about equal in length to the head: ventral just reaches the anal spines, which are of moderate strength, the third being slightly the longest: caudal forked. The height of the free portion of the tail at its commencement equals its length. *Scales*—from $5\frac{1}{2}$ to 4 entire and 2 half rows between the lateral-line and the sixth dorsal spine. *Colours*—greenish-olive, with an oblong blackish blotch below the lateral-line opposite the middle of the dorsal fin.

Klunzinger gives only $4\frac{1}{2}$ rows of scales above the lateral-line; if such is not a typographical error his fish cannot be this species.

Habitat.—Red Sea, through those of India to the Malay Archipelago.

Genus, 4—Sphærodon, *Rupp.*

Chrysophrys, sp. Cuv. and Val.: *Pagrus*, sp. Bleeker.

Branchiostegals six: pseudobranchiæ. Jaws with conical canines anteriorly and a single row of molars laterally. A single dorsal fin with ten spines, receivable into a groove at their base: three anal spines. Scales of moderate size extending on to the cheeks. Pyloric appendages few.

Geographical distribution.—Red Sea, throughout those of India to the Malay Archipelago.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Sphærodon heterodon*, D. $\frac{10}{10}$, A. $\frac{3}{9}$, L. l. 44-48. Rose-coloured, base of pectoral violet. Ceylon and Malay Archipelago.

1. Sphærodon heterodon.

Pagrus heterodon, Bleeker, Gilolo, p. 54.
Sphærodon heterodon, Günther, Catal. i, p. 465.

B. vi, D. $\frac{10}{10}$, P. 15, V. 1/5, A. $\frac{3}{9}$, C. 17, L. l. 44-48, L. tr. 5/14.

Length of head 1/4, of caudal 1/4 in the young to 2/9 in the adult, height of body 2/7 of the total length. *Eyes*—diameter 3/7 to 1/3 of length of head, 2/3 to 1 diameter from end of snout, and 1 diameter apart. A swelling over the anterior superior edge of the orbit. The maxilla reaches to below the first third of the orbit. *Teeth*—generic, the molars very broad. *Fins*—dorsal spines increasing in length to the third and fourth, from whence they continue about the same length: pectoral extends to above the anal: caudal deeply forked and elongated in the young. *Colours*—rosy, scales with darker edges: base of pectoral violet.

Habitat.—Ceylon and Malay Archipelago.

Genus, 5—Pagrus, *Cuv.*

Argyrops, Swains.

Branchiostegals six: pseudobranchiæ. Jaws with an anterior row of conical canines, and laterally two or even a rudimentary third row of rounded molars. A single dorsal fin with from eleven to twelve, sometimes elongated, spines, receivable into a groove at their base: anal with three. Scales of moderate size, extending on to the cheeks. Air-vessel simple. Pyloric appendages, when present, in small numbers.

Geographical distribution.—Mediterranean, Atlantic shores of America, Red Sea, and throughout those of Africa and India to Australia.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Pagrus spinifer*, D. $\frac{11-12}{9-10}$, A. $\frac{3}{8-9}$, L. l. 53, L. tr. 6-7/18. Whitish, with pink vertical bands. Red Sea and seas of India to the Malay Archipelago.

1. Pagrus spinifer, Plate XXXIII, fig. 5.

Sparus spinifer, Forsk. p. 32; Gmel. Linn. i, p. 1273; Bl. Schn. p. 281; Russell, Fish. Vizag. ii, p. 1, pl. 101.

Pagrus spinifer, Cuv. and Val. vi, p. 156; Rüppell, N. W. Fische, p. 114; Günther, Catal. i, p. 472; Klunz. Fische d. Roth. Meer. p. 761.

Pagrus longifilis, Cuv. and Val. vi, p. 159; Bleeker, Celebes, iii, p. 756.

Soh-ru, Belooch.: *Kooroota*, Tel.: *Soh-ru*, Belooch.: *Pununtlai*, Tam.

B. vi, D. $\frac{11-12}{9-11}$, P. 15, V. 1/5, A. $\frac{3}{8-9}$, C. 17, L. l. 53, L. tr. 6-7/18, Cæc. pyl. 5.

Length of head 3/11 to 4/15, of caudal 1/5 to 2/11, height of body 3/7 to 2/5 of the total length. *Eyes*—

diameter $3\frac{1}{3}$ to 1/4 in length of head, $1\frac{1}{2}$ to 2 diameters from end of snout, and nearly one apart. Dorsal profile rather more convex than that of the abdomen, a more or less developed protuberance before the anterior-superior angle of the eyes. The maxilla reaches to below the front edge of the orbit. Preorbital very deep, being equal to from 1 to $1\frac{1}{4}$ diameters of the orbit. Preopercle crenulated at its angle and along its lower limb: opercle high and narrow having two very blunt points. *Teeth*—four conical incisors in front of both jaws, with about three rows of rounded teeth immediately behind them: two rows of teeth with rounded crowns along the sides of either jaw, the most interior being small and in above two rows, the first few in the outer row of the maxilla may be more or less conical. *Fins*—dorsal spines of moderate strength and compressed, the young having filamentous prolongations, two first very short, just appearing above the scales, the third the longest in the fin, often longer than the head, and its interspinous membrane cleft to the base of the fourth spine, the membrane between the rest of the spines deeply emarginate. Pectoral one-third longer than the head: ventral reaches as far as the anus: the second anal spine a little stronger than the third and of about equal length, being $2\frac{1}{4}$ to $2\frac{1}{2}$ or even 1/3 in the length of the head: caudal emarginate. *Scales*—cycloid, about six rows between the orbit and the angle of the preopercle. *Colours*—whitish, with pinkish bands passing along the centre of every scale becoming rather indistinct below the middle of the height of the body. In specimens up to 4 inches in length there are five vertical bands on the body.

Dr. Günther, l. c. observes that a young specimen from China in the British Museum has A. $\frac{4}{8}$, a number I have not observed in Indian examples. In two young specimens (to 3 inches) from Sind the filamentous prolongation of the dorsal fin reaches to the base of the caudal.

A specimen from Sind, 11 inches long, has a very prominent protuberance above and in front of the orbits.

Habitat.—Red Sea, East coast of Africa, seas of India to the Malay Archipelago.

Genus, 6—CHRYSOPHRYS, *Cuv.*

Chrysoblephus, Swainson.

Branchiostegals six: pseudobranchiæ. Body oblong, compressed. Four to eight conical or compressed teeth anteriorly, and three or four rows of rounded molars laterally in either jaw. A single dorsal fin, with from eleven to thirteen spines, receivable into a groove at their base: anal with three spines. Scales of moderate size, extending over the cheeks. Air-vessel sometimes notched or with very short appendages. Pyloric appendages few.*

Geographical distribution.—Red Sea, coasts of Africa, seas of India to the Malay Archipelago and beyond.

Some stress has been laid in the discrimination of species in this genus as to whether the lower edge of the preorbital is straight or notched, in order to receive the posterior extremity of the maxillary bone. This sign however is of little if any value, for it may be straight, emarginate or deeply notched in the same species, as seen in *C. berda*, &c. The proportionate height of the preorbital to the diameter of the orbit varies with age, and its depth appears, as a rule, to increase, while that of the eye decreases, in comparison to the length of the head. Likewise, as is also the case in some other Genera, as *Pristipoma*, having the alternate dorsal spines broad on one side and not on the other,—it is not an invariable rule that the broad side shall be the first, third, fifth, and so on, for in specimens of the same species they may be the second, fourth, sixth, &c. The length of the second anal spine is subject to considerable differences, see *C. Cuvieri*, whilst the number of dorsal spines likewise varies.

SYNOPSIS OF SPECIES.

1. *Chrysophrys datnia*, D. $\frac{11-13}{11-10}$, A. $\frac{3}{8-9}$, L. l. 46-48, L. tr. 4-5/11, Cæc. pyl. 4. Six incisors in front of either jaw, an outer compressed row along a portion of the rami, and four or five rows of rounded molars in the upper and three or four in the lower jaw: $3\frac{1}{2}$ rows of scales between the lateral-line and the base of the dorsal spines. Greyish. Seas and estuaries of India.

2. *Chrysophrys berda*, D. $\frac{11-12}{11-12}$, A. $\frac{3}{8-10}$, L. l. 44-46, L. tr. 6/13, Cæc. pyl. 3. Six incisors in front of either jaw: an outer rather conical row along a portion of the upper jaw: four rows of rounded teeth in the upper and three in the lower jaw: four entire and two half rows between the lateral-line and the base of the spinous dorsal. Greyish, a dark opercular spot. Seas of India to the Malay Archipelago and beyond.

3. *Chrysophrys Cuvieri*, D. $\frac{11}{11-12}$, A. $\frac{3}{8-9}$, L. l. 48, L. tr. 4-5/12. Six conical incisors in front of either jaw, with villiform teeth behind them: the outer row at the sides rather conical and compressed: molars small, three rows in the upper and two in the lower jaw. Greyish, fins nearly black. Seas of India ? to the Malay Archipelago and beyond.

4. *Chrysophrys bifasciata*, D. $\frac{11}{12-15}$, A. $\frac{3}{10-11}$, L. l. 48-50, L. tr. 7/15. Dorsal, caudal and pectoral yellow, ventral and anal black. Two vertical black bands on the head. Red Sea and seas of India.

5. *Chrysophrys sarba*, D. $\frac{11}{13-14}$, A. $\frac{3}{11}$, L. l. 55-60, L. tr. 6-7/14. From four to six broad compressed incisors in front of the upper and six to eight in the lower jaw, three rows of large molars in the lower and four in the upper jaw. Silvery, with golden bands along each row of scales. Red Sea and seas of India.

6. *Chrysophrys haffara*, D. $\frac{11}{13}$, A. $\frac{3}{11}$, L. l. 60, L. tr. 7/14. Six compressed incisors in front of either jaw,

* "It must be considered, as a rule, *in those fishes with a truly single dorsal fin, composed of a spinous and soft portion, that often one or two soft rays, nearest to the spines are transformed into true spines,* the number of the latter thus appearing to be increased." Günther, Catal. i, p. 493. For instances advanced to the contrary, see l. c. p. 183, respecting *Genyoroge* and *Mesoprion.*

three rows of rounded teeth in the lower, four in the upper jaw. Second anal spine 1/3 of length of head. Silvery, with golden bands along the rows of scales on the body. Red Sea, seas of India to China.

1. **Chrysophrys datnia**, Plate XXXIV, fig. 1.

Coius datnia, Ham. Buch. Fish. Ganges, pp. 88, 369, pl. 9, f. 29.

Chrysophrys longispinis, Cuv. and Val. vi, p. 116; Bleeker, Beng. p. 93.

Chrysophrys Schlegelii, Bleeker, Japan, p. 400, and Verh. Bat. Gen. xxvi, p. 86.

Chrysophrys hasta, Günther, Catal. i, p. 490 (not *Sparus hasta*, Bl. Schn.); Day, Fish. Mal. p. 29; Kner. Nov. Fische, p. 88.

B. vi, D. $\frac{11-13}{11-10}$, P. 15, V. 1/5, A. $\frac{3}{8-9}$, C. 17, L. l. 46-48, L. tr. 4-5/11, Cæc. pyl. 4.

Length of head from 1/4 to 4/17, of caudal 1/6, height of body 4/11 of the total length. *Eyes*—diameter 1/4 to 1/5 of length of head, 1 to $1\frac{1}{2}$ diameter from end of snout, and also apart. A slight protuberance above the anterior-superior angle of the orbit. Dorsal profile considerably elevated. Preorbital twice as long as deep, its lower edge usually almost straight, but occasionally notched. In a large specimen in the British Museum it is emarginate in the last three-fourths of its lower edge. The maxilla reaches to below the middle of the orbit. Vertical limb of preopercle very finely serrated: opercle with a well developed spine. *Teeth*—six incisors in front of either jaw, more closely set and less pointed than in *C. Cuvieri*, and with rounded teeth behind them; an outer compressed row, (neither so large or pointed as in the last species, and blunted in the adult.) extending for only four or five teeth, exists in either jaw, internal to which are three or four rows of rounded molars in the lower and four or five in the upper jaw: the inner teeth of the hind rows are the largest: there are no villiform teeth in either jaw. *Fins*—alternate dorsal spines strongest on one side, the fourth being the longest, and as long as the postorbital portion of the head: first anal spine short, the second as long as the head excluding the snout. *Lateral-line*—$3\frac{1}{2}$ rows of scales between it and the sixth dorsal spine, 10 rows between the base of the ventral fin and the lateral-line. *Colours*—silvery-grey, the bases of the scales darkest and their edges silvery, this is most distinct above the lateral-line: a dark interorbital band: dorsal and caudal with black edges, a dark band along the soft dorsal and the first few anal rays.

Dr. Günther (Catal. i, p. 490) considers *C. xanthopoda* and *C. auripes*, Richardson, synonyms of this species. It differs from *C. berda* in its teeth, likewise in the strength of the dorsal spines, the number of pyloric appendages, and also of the rows of scales.

Habitat.—The specimen figured (6 inches long) is from the Hooghly at Calcutta, where it attains at least 18 inches in length. It is found from the Red Sea throughout those of India to the Malay Archipelago and beyond.

2. **Chrysophrys berda**, Plate XXXIV, fig. 2, and XXXV, fig. 2 (var. *calamara*.)

Sparus berda, Forsk. p. 32; Lacép. iv, pp. 31, 105; Bl. Schn. p. 278 (not Risso.)

Sparus hasta, Bl. Schn. p. 275.

Sparus calamara, Russell, i, p. 63, pl. xcii.

Chrysophrys berda, Rüpp. N. W. Fische, p. 120, t. 27, f. 4; Cuv. and Val. vi, p. 113; Richards. Ich. China, p. 240; Günther, Catal. i, p. 494; Klunz. Fische d. Roth. Meer. 1870, p. 758.

Chrysophrys calamara. Cuv. and Val. vi, p. 117; Bleeker, Spar. p. 10; Cantor, Catal. p. 48; Günther, Catal. i, p. 493; Day, Fish. Malabar, p. 30.

Dun-de-a, Sind.: *Calamara*, Tel.: *Arce*, Mal.: *Coorrie* and *Currapu-mattava*, Tam.: *Kala mudwan*, Hind.: *Nya-wah*, Mugh.: *Moo-roo-kee-duh*, Audam.: *Jarras*, Sind.

B. vi, D. $\frac{11-12}{11-12}$, P. 15, V. 1/5, A. $\frac{3}{8-10}$, C. 17, L. l. 44-46, L. r. $\frac{46}{42}$, L. tr. 6/13, Cæc. pyl. 3.

Length of head 1/4, of caudal 1/5 to 1/6, height of body 3/8 to 2/5 of the total length. *Eyes*—diameter 2/7 to 1/4 of length of head (in a young specimen $4\frac{3}{10}$ inches long 1/3), $1\frac{1}{4}$ to $1\frac{1}{2}$ diameters from end of snout, and also apart. Dorsal profile more convex than that of the abdomen, snout compressed and somewhat pointed. The maxilla reaches to below or slightly behind the front edge of the orbit. Preorbital narrow with its lower edge straight, emarginate or even notched above the end of the maxilla. Vertical limb of preopercle a little roughened or even minutely serrated: opercle with a distinct spine. *Teeth*—six incisors in front of either jaw, the remainder of the teeth with rounded crowns except a few in the outer row of the upper jaw, which are occasionally not so obtuse as the others: three or four rows in the lower jaw, four or five in the upper, the largest being the last of the inner series. *Fins*—each alternate dorsal spine strongest on one side, the fourth or fifth being slightly the longest and equalling from about 1/2 to 2/3 the length of the head. Pectoral slightly longer than the head. Ventral not reaching the anus. Second anal spine much the strongest equalling from 1/2 or a little more (in typical *berda*) to 3/4 of the length of the head (in the variety *calamara*), in which last it is much the strongest: caudal emarginate. *Scales*—four entire and two half rows between the lateral-line and the base of the spinous dorsal: nine rows between the base of the ventral and the lateral-line. *Air-vessel*—notched posteriorly. *Colours*—in *berda* silvery-grey. Scales darkest at their bases and usually a black spot behind the opercle on the shoulder. A black edge to the dorsal interspinous membrane, soft dorsal, caudal, and anal with black edges: a dark band along the anal fin. In specimens from Sind brownish bands usually radiate from the eye. In the variety *calamara* the fish is dark-greyish, the scales with dark edges, the fins black or edged with black. Some specimens are much darker than others.

Valenciennes vi. p. 115, observes that he has compared *Sparus hasta*, Bl. Schn. with *S. berda* (Forsk.) C. V. and that they are identical. "Valenciennes confounds under the name of *Chr. berda*, Bengal specimens of

Sparus hasta with eleven dorsal spines and *Sp. berda*, Forsk." (Günther, Catal. i, p. 491). Professor Peters having shown me a specimen $14\frac{1}{2}$ inches long with Bl. Schn.'s name *Sparus hasta* on it, marked as his type, and which was sent to Valenciennes, by whom it is also labelled, I certainly think that Valenciennes was correct and the specimen belongs to the variety *calamara*.

Habitat.—Red Sea, and seas of India to the Malay Archipelago and beyond. I have taken specimens of *berda* in Sind 30 inches in length. The *calamara* is known as "black rock cod" in the Madras Presidency, and is excellent eating: it is common in Malabar until July.

3. **Chrysophrys Cuvieri**, Plate XXXIV, fig. 3.

Dentex hasta, Cuv. and Val. vi, p. 255; Günther, Catal. i, p. 373 (not *Sparus hasta*, Bl. Schn.)

B. vi, D. $\frac{11}{11-12}$, P. 15, V. 1/5, A. $\frac{3}{8-9}$, C. 17, L. l. 48, L. tr. 4-5/13.

Length of head 2/7 to 1/4, of caudal 1/6, height of body from 2/7 to 1/3 in the young of the total length. *Eyes*—diameter 1/6 (to 1/4 in the young) of length of head, $1\frac{1}{4}$ to 2 diameters from end of snout, and $1\frac{1}{2}$ apart. Dorsal profile scarcely elevated in the adult, that of the abdomen almost horizontal. Preorbital low in the young with an almost straight inferior edge, in an adult (as $14\frac{1}{2}$ inches) the depth of the preorbital equals the diameter of the eye. The maxilla reaches to below the front third of the orbit or to under its centre in the adult. Vertical limb of preopercle very minutely serrated in the immature: opercle with a distinct spine. *Teeth*—four to six sharp, pointed and rather conical incisors in front of either jaw, with villiform teeth behind them: a pointed and compressed row along the outer side of either jaw, the last few of which are small and with rounded crowns; internal to these are two rounded rows of small molars in the lower and three in the upper jaw. In a fine specimen $14\frac{1}{2}$ inches in length this distribution of the teeth is still seen, and the size of the molars is far less than is apparent in any other of the genus taken in India; they approach very close to the dentition of *Dentex nufar*, pl. 34, f. 4, which was mislaid until too late to insert in its proper place. *Fins*—alternate dorsal spines strongest on one side, the fourth or fifth being the highest, and nearly equalling the length of the postorbital portion of the head in the young or 1/3 the height of the body in the adult: pectoral not quite so long as the head: first anal spine short, the second strong and equal to half the length of the head or even more in the young, but it greatly decreases in comparative length with age, being only $2\frac{2}{3}$ in the length of the head in the adult: caudal slightly lobed. *Scales*—seven rows between the eye and angle of the preopercle: a few over the base of the soft portion of the dorsal: a band at the base of the anal: the caudal with fine ones almost to its end: four entire and two half rows between the lateral-line and the base of the spinous dorsal: 10 rows between the base of the ventral fin and the lateral-line. *Lateral-line*—very slightly curved. *Colours*—silvery-grey, about eight lines radiate from the eye and posterior edge of the preorbital: each row of scales has a darkish band along its centre: dorsal and caudal fins black tipped, a grey band along the centre of the dorsal fin and a grey spot at the base of each spine and ray: anal spines grey, the membrane and rays black except the two last rays which are white.

This species differs from the *C. datnia* in its teeth and more pointed snout, whilst the head at its widest part only equals its postorbital length. It is identical with the two specimens of *Dentex hasta*, C. V. in the Paris Museum.

Habitat.—Seas of India to at least $14\frac{1}{2}$ inches in length: the figure is from a specimen captured at Mangalore measuring $14\frac{1}{2}$ inches.

4. **Chrysophrys bifasciata**, Plate XXXIV, fig. 5.

Chætodon bifasciatus, Forsk. p. 64.
Holocentrus rabaji, Lacép. iv, p. 725.
Sparus mylio, Lacép. iii, pl. 26, f. 2, and iv, p. 131.
? Labrus catenula, Lacép. iii, p. 467, pl. 26, f. 3.
Chrysophrys bifasciata, Cuv. and Val. vi, p. 118; Rüpp. N. W. Fische, p. 112; Günther, Catal. i, p. 488; Klunz. Fische d. Roth. Meer. Verh. z. b. Ges. Wien, 1870, p. 758.
Bah-mear, Bel.

B. vi, D. $\frac{11}{12-15}$, P. 15, V. 1/5, A. $\frac{3}{10-11}$, C. 19, L. l. 48-50, L. tr. 7/15, Cæc. pyl. 2.

Length of head 2/7, of caudal 2/11, height of body 2/5 of the total length. *Eyes*—diameter 2/9 of length of head, $1\frac{1}{2}$ to 2 diameters from end of snout, and $1\frac{1}{3}$ apart. Dorsal profile more convex than the abdominal: a slight elevation above the anterior angle of the eye. The maxilla reaches to below the middle of the orbit: preopercular margin a little roughened above its angle, its height equal to at least the diameter of the eye. *Teeth*—six large compressed incisors in the front of the upper and four in the lower jaw: five rows of rounded molars along the sides of the upper and four in the lower jaw. *Fins*—dorsal spines strong increasing in length to the fifth, which is two-fifths of the length of the head, whilst the rays are scarcely higher than the spines: pectoral a little longer than the head: ventral does not reach the anus: second anal spine much the strongest and equal in length to the third: caudal forked. *Colours*—silvery, with dark lines along each row of scales on the body, and having two black cross bands, the first through the eye, the second over the hind edge of the opercle: a yellow band before the eyes, snout black, dorsal, caudal and pectoral yellow, dorsal spine black, and a narrow black edge along soft dorsal: ventral and anal black except the last anal ray which is yellow.

Habitat.—Red Sea, East coast of Africa and seas of India, attaining at least 15 inches in length. The specimen figured is from Sind and 14 inches long.

5. Chrysophrys sarba, Plate XXXIV, fig. 6.

Sparus sarba, Forsk. p. 31; Gmel. Linn. p. 1275; Bl. Schn. p. 280; Lacép. iv, pp. 97, 103.
Sparus bufonites, Lacép. iv, pp. 141, 143, pl. 26, fig. 3.
Sparus psittacus, Lacép. iv, p. 141.
Sparus chitchillee, Russell, i, p. 73, pl. xci.
Chrysophrys sarba, Cuv. and Val. vi, p. 102; Rüpp. N. W. Fische, p. 110, pl. 28, f. 1; Günther, Catal. i, p. 488; Kner, Novara Fische, p. 88; Klunz. Fische d. Roth. Meer. 1870, p. 759.
Chrysophrys chrysargyra, Cuv. and Val. vi, p. 107.
Tin-til, Belooch.: *Chitchillée*, Tel.: *Vella-mattawa*, Tam.: *Suffadu-muddawa*, Hind.

B. vi, D. $\frac{11}{13-14}$, P. 15, V. 1/5, A. $\frac{3}{11}$, C. 17, L. l. 55-60, L. tr. 6-7/14.

Length of head 1/4 to $4\frac{1}{4}$, of caudal 2/11 to 1/5, height of body 2/5 to 4/11 of the total length. *Eyes*—diameter 1/3 to $3\frac{3}{4}$ in the length of head, $1\frac{1}{2}$ diameters from end of snout, and $1\frac{1}{4}$ apart. Dorsal profile slightly more convex than that of the abdomen. The maxilla reaches to below the front edge of the eye. Preorbital rather above one diameter of the eye in height. Vertical limb of preopercle entire, its angle and lower edge crenulated: opercle with a badly marked spine. *Teeth*—from four to six broad and compressed incisors in the front of the upper jaw and six to eight in the lower, the remainder of the teeth with rounded crowns the largest being in the inner row, about three rows in the lower and four in the upper jaw. *Fins*—dorsal spines of moderate strength alternately broader on one side, the fourth being the highest and equal to a little more than half the length of the head. Pectoral longer than the head: ventral not quite reaching the anal and its spine rather longer than the highest in the dorsal fin: second anal spine strongest, of equal length or a little shorter than the third and equal to the length of the sixth of the dorsal or 1/2 the length of the head: caudal emarginate or slightly lobed. *Scales*—five rows between the eye and the angle of the preopercle: some small ones over the caudal fin, about $5\frac{1}{2}$ rows between its almost straight lateral-line and the base of the dorsal fin. *Colours*—silvery, with golden bands along each row of scales, parallel to the back above the lateral-line and horizontal below it: no dark blotch on the shoulder above the opercle: fins yellowish with a tinge of grey along the upper portion of the dorsal and the end of the caudal: a dark band along the middle of the former fin. Eyes golden.

Habitat.—From the Red Sea through those of India, attaining at least 16 inches in length. They abound in Madras about April, when the young ascend the rivers and backwaters. As food it is inferior to the *berda*.

6. Chrysophrys haffara, Plate XXXV, fig. 1.

Sparus haffara, Forsk. p. 33; Gmel. Linn. p. 1276; Bl. Schn. p. 279.
Chrysophrys haffara, Cuv. and Val. vi, p. 108; Rüpp. N. W. Fische, p. 111, t. 29, f. 1; Günther, Catal. i, p. 488; Klunz. Fische d. Roth. Meer. Verh. z. b. Ges. Wien, 1870, p. 760.
? *Chrysophrys aries*, Temm. and Schleg. Fauna Japon. Poiss. p. 68, pl. 31; Bleeker, Verh. Bat. Gen. xxvi, p. 87; Günther, Catal. i, p. 489.

B. vi, D. $\frac{11}{13}$, P. 15, V. 1/5, A. $\frac{3}{11}$, C. 17, L. l. 60, L. tr. 6-7/14, Cæc. pyl. 3.

Length of head $4\frac{1}{4}$ to $4\frac{1}{2}$, of caudal $4\frac{1}{2}$ to 1/5, height of body $2\frac{3}{4}$ in the total length. *Eyes*—diameter $3\frac{1}{4}$ to $4\frac{1}{4}$ in the length of the head, $1\frac{1}{2}$ to 2 diameters from end of snout, and 1 apart. Dorsal profile more convex than that of the abdomen, a prominence over the forepart of the orbit causing the snout to appear somewhat vertical: posterior nostril very elongated. The maxilla reaches to below the first edge of the orbit. Preorbital deep, being 1 diameter of the orbit in height. Preopercle entire: opercle with a spine. *Teeth*—six conical and compressed ones in front of either jaw, sometimes only four in the lower, the remainder of the teeth with rounded crowns the largest being in the inner row, three rows in lower four in upper jaw. *Fins*—dorsal spines rather weak, their breadth on both sides being nearly equal, the fourth the highest and equal to two-fifths of the length of the head. Pectoral longer than the head: ventral reaches the anus, its spine a little longer than the fourth of the dorsal: anal spines comparatively weak, the second a little the strongest and slightly the longest, equal to $2\frac{1}{4}$ to $2\frac{3}{4}$ in the length of the head: caudal lobed. *Scales*—five rows between the eye and the angle of the preopercle, about $5\frac{1}{2}$ rows between its slightly curved lateral-line and the base of the dorsal fin, a very long one at base of ventral fin. *Colours*—silvery, with golden bands along each row of scales as in *C. sarba*: usually no black mark on the shoulder, fins grey, ventral and anal almost black.

This species is evidently closely allied to the *C. sarba*, and I have only obtained it in Sind; it is however at once recognised by its comparatively short and weak anal spines.

Habitat.—Red Sea and Sind to (?) China: the largest specimen I obtained in Sind measured 12 inches in length.

Fourth group—Pimelepterina.

Cutting teeth in front of the jaws and teeth on the palate.

Genus, 7—Pimelepterus *(Lacép.) Cuv.*

Kyphosus, (Lacép.) Cuv.

Branchiostegals seven: pseudobranchiæ. Preopercle as a rule serrated. Villiform teeth in the jaws, with an outer row of cutting ones: fine teeth on the vomer, palatines, and tongue. A single dorsal with eleven spines, anal

with three. Scales of moderate size, fine ones over the soft portions of the vertical fins. Air-vessel divided posteriorly into two long processes, sometimes notched anteriorly. Pyloric appendages few or very numerous.

Geographical distribution.—Red Sea, those of Africa, India, Malay Archipelago and beyond.

SYNOPSIS OF SPECIES.

1. *Pimelepterus fuscus*, D. $\frac{10-11}{13-15}$, A. $\frac{3}{12}$, L. r. $\frac{86}{75}$. Fifth to seventh dorsal spines one-third to one-half higher than the rays. Red Sea, seas of India to the Malay Archipelago.

2. *Pimelepterus cinerascens*, D. $\frac{11}{12}$, A. $\frac{3}{11}$, L. r. $\frac{65-70}{58-60}$. Fourth and fifth dorsal spines nearly as high as the rays. Red Sea, East coast of Africa, seas of India to the Malay Archipelago.

1. Pimelepterus fuscus.

Xyster fuscus, (Comm.) Lacép. pp. 484, 485.

Pimelepterus fuscus, Cuv. and Val. vii, p. 264; Rüpp. N. W. Fische, p. 34, t. 10, f. 3; Günther, Catal. i, p. 498; Klunz. Verh. z. b. Ges. Wien, 1870, p. 796.

? *Pimelepterus Waigiensis*, Quoy and Gaim. Voy. Frey. Zool. p. 386, pl. 62, f. 4; Günther, Catal. i, p. 498.

? *Pimelepterus marciae*, Cuv. and Val. vii, p. 267; Rüpp. l. c. p. 35; Bleeker, Waigiou, p. 3.

Pimelopterus fuscus, Klunz. Verh. z. b. Ges. Wien, 1870, p. 796.

B. vii, D. $\frac{10-11}{15-13-14}$, P. 18, V. 1/5, A. $\frac{3}{12}$, C. 17, L. l. 60, L. r. $\frac{86}{75}$, L. tr. 10/23, Cæc. pyl. numerous.

Length of head 1/5, of caudal 1/5, height of body 1/3 of the total length. *Eyes*—diameter 1/4 of length of head, rather above 1 diameter from the end of snout, and $1\frac{1}{2}$ apart. Body oblong, compressed, and with a swelling opposite the front of the orbit. The maxilla reaches to nearly below the front edge of the orbit. Preopercle with its angle serrated. Sub- and inter-opercles entire: preorbital very finely serrated. *Teeth*—in a single compressed row, their horizontal portions being rather longer than their vertical: minute teeth on the vomer and palate. *Fins*—dorsal spines of moderate strength, increasing in length to the fifth, sixth, and seventh, which are 1/3 to one-half higher than the longest ray: pectoral slightly longer than the ventral, which equals the length of the head behind the middle of the eye: anal spines of moderate strength, the third much the longest and equal to half the length of the first ray: caudal emarginate. *Scales*—over vertical fins, 21 rows between the ventral fin and the lateral-line, and 11 or 12 between it and the base of the sixth dorsal spine. *Colours*—grey, darkest along the back and at the edges of the scales. A silvery band under the eyes.

The difference between the *cinerascens* and *fuscus* is chiefly to be found in the larger number of scales, the greater comparative height of the soft dorsal and anal fins in the latter to what exists in the former, and the size of the pectoral and ventral fins, as well as that of the eye. This *may* however be only a sexual difference, and the various species merely varieties. Klünzinger places *P. marciae*=*Waigiensis*, C.V. as synonyms to *P. tahmel*=*cinerascens*, Forsk.

Habitat.—Red Sea, throughout those of India to the Malay Archipelago and beyond; attaining upwards of 2 feet in length.

2. Pimelepterus cinerascens, Plate XXXV, fig. 3.

Sciæna cinerascens, Forsk. No. 66, p. 53.

Pimelepterus altipinnis, Cuv. and Val. vii, p. 270; Bleeker, Banka, ii, p. 727.

Pimelepterus tahmel,* Rüpp. N. W. Fische, p. 35, t. 10, fig. 4; Günther, Catal. i, p. 499; Bleeker, Solor, p. 5.

? *Pimelepterus Dussumieri*, Cuv. and Val. vii, p. 274.

Pimelopterus tahmel, Klunz. Verh. z. b. Ges. Wien, 1870, p. 795.

Thendala, Tam.

B. vii, D. $\frac{11}{12}$, P. 18, V. 1/5, A. $\frac{3}{11}$, C. 17, L. l. 60, L. r. $\frac{65-70}{58-60}$, L. tr. 10/21, Cæc. pyl. numerous, short.

Length of head 2/9, of caudal 2/11, height of body nearly or quite 1/3 of the total length. *Eyes*—diameter 2/7 of length of head, 1 diameter from end of snout, and $1\frac{1}{3}$ apart. Body oblong, compressed, with a slight swelling opposite the front of the orbit. The maxilla reaches to below the front edge of the orbit. Preopercle with its angle serrated, sub- and inter-opercles entire: preorbital finely serrated. *Teeth*—in a single compressed row, their horizontal portions being about one-third longer than their vertical, minute ones on vomer and palate. *Fins*—dorsal spines of moderate strength, increasing in length to the fourth and fifth which are nearly as high as the middle rays, which are the highest in the fin, the whole being enveloped in scales: pectoral of the same length as the ventral and equal to the head excluding the snout: anal spines of moderate strength, the third slightly the longest but only half or two-fifths of the height of the anterior portion of the soft anal, which is scaled as is also the soft dorsal: caudal emarginate. *Air-vessel*—divided posteriorly, one portion passing along either side of the caudal vertebræ to above the hind end of the caudal fin: anteriorly it is not divided. *Scales*—19 rows between the ventral fin and lateral-line, and 9 between the latter and the base of the sixth dorsal spine. *Colours*—silvery-grey, with a dark band between each row of scales: a silvery band under the eye: fins nearly black.

Habitat.—Red Sea, East coast of Africa, seas of India to the Malay Archipelago.

* *Tahmel* is the Arabic name of this fish according to Forskäl, whilst *cinerascens* is the specific term he applied to the species.

Family, VI—CIRRHITIDÆ, *Gray.*

Percoidei, pt., et *Sciænoidei*, pt., Cuv.: *Theraponidæ*, pt., et *Polynemidæ*, pt. Richardson.

Branchiostegals three, five or six: pseudobranchiæ. Body oblong and compressed. Mouth in front of snout having a lateral cleft. Eyes of moderate size: cheeks not cuirassed. Teeth in the jaws villiform or pointed, sometimes canines as well: vomerine and palatine teeth present or absent. A single dorsal fin composed of spines and rays of nearly equal extent: anal with three spines. Lower pectoral rays simple, and generally thickened: ventrals thoracic, at some distance from the insertion of the pectorals, and having one spine and five rays. Scales cycloid: lateral-line continuous. Air-vessel absent, or with many appendages. Pyloric appendages few.

Geographical distribution.—Tropical seas, likewise in the temperate parts of the South Pacific.

SYNOPSIS OF GENERA.

1. *Cirrhites.* Branchiostegals six. Opercle unarmed. No teeth on the palatines. Seas of India to the Malay Archipelago and beyond.
2. *Cirrhitichthys.* Branchiostegals six. Opercle with spines. Teeth on the palatines. Seas of India to the Malay Archipelago and beyond.

Genus, 1—Cirrhites, *(Comm.) Cuv.*

Amblycirrhitus, Gill; *Paracirrhites*, Bleeker.*

Branchiostegals six. Preopercle denticulated: opercle unarmed. Villiform teeth in both jaws: canines generally present: teeth on the vomer, none on the palatines. A single dorsal fin with ten spines: the lower five to seven pectoral rays are unbranched. Scales of moderate size. Air-vessel absent. Pyloric appendages few.

SYNOPSIS OF SPECIES.†

1. *Cirrhites Forsteri*, D. $\frac{10}{11}$, P. 7+VII, A. $\frac{3}{6}$, L. l. 50. Head and chest with black spots: a broad brown or black band from the head to the upper half of the tail, and a yellow one below it. East coast of Africa, seas of India.
2. *Cirrhites fasciatus*, D. $\frac{10}{12}$, P. 9+V, A. $\frac{3}{6}$. Greyish, vertically banded with darker: white spots on head and nape. Pondicherry.

1. Cirrhites Forsteri, Plate XXXV, fig. 4.

Perca tæniata, Forster, Descrip. Anim. p. 224.
Grammistes Forsteri, Bl. Schn. p. 191.
Sparus pantherinus, Lacép. iv, p. 160, t. vi, fig. 1.
Cirrhites pantherinus, Cuv. and Val. iii, p. 70; Less. Voy. Coq. Poiss. p. 225, pl. 22, fig. 1; Bleeker, Banda, p. 232.
Serranus Tankervillæ, Bennett, Ceylon, p. 27, p. 27.
Cirrhites Forsteri, Günther, Catal. ii, p. 71, and Garrett's Fische d. Sudsee, t. xliv, A; Gill, Proc. Am. Ac. Nat. Sci. Phil. 1862, p. 112; Klunz. Verh. z. b. Ges. Wien, 1870, p. 797.
Amblycirrhites Forsteri, Bleeker, Ned. T. Dierk. iii, p. 175.
Paracirrhites Forsteri, Bleeker, Cirrh. 1874, p. 6.

B. vi, D. $\frac{10}{11}$, P. 7+VII, V. 1/5, A. $\frac{3}{6}$, C. 15, L. l. 50, L. tr. 5/13, Cæc. pyl. 4, Vert. 10/16.

Length of head $3\frac{1}{2}$ to 1/4, of caudal 1/7, height of body $3\frac{1}{4}$ to $3\frac{1}{2}$ in the total length. *Eyes*—diameter

* Genus *Oxycirrhites*, Bleeker, has the premaxillary produced a considerable distance in front of the mouth. Genus *Paracirrhites* has the scales on the cheeks large and regularly imbricated, and those on the body smaller; whereas in *Cirrhites* the scales on the body are large, and those on the cheeks small.

† I have not included *C. punctatus*, C. and V. iii, p. 70, which Dr. Günther (in Catal. ii, p. 72) states comes from the "Indian Ocean ?" as in the 'Histoire Naturelle des Poissons,' its locality is not given. In the British Museum Catalogue the existence of one specimen is thus recorded, "*a*, Adult: stuffed. Sine patria." On the stand this is now marked "W. Indies." The specimen is as follows.

D. $\frac{10}{11}$, P. 7+VII, V. 1/5, A. $\frac{3}{6}$, C. 16, L. r. 42, L. tr. 5/10.

Length of head $3\frac{2}{3}$, of caudal 2/11, height of body $3\frac{1}{3}$ of the total length. *Eyes*—diameter 2/9 of length of head, $1\frac{1}{3}$ diameters from end of snout, and 2/3 of a diameter apart. Vertical limb of preopercle finely serrated. Interorbital space deeply convex. A short tentacle at the anterior nostril. *Fins*—fifth dorsal spine the longest, equalling the length of the rays, or $2\frac{2}{3}$ the height of the body: second anal spine much the longest, equalling the highest in the dorsal fin.

2/9 to 2/11 of length of head, $1\frac{1}{2}$ diameters from end of snout, and 1 apart. The maxilla reaches to below the middle of the orbit. Vertical limb of preopercle finely serrated, angle oblique, its lower limb also the sub- and inter-opercles and the preorbital entire: a blunt opercular point. Anterior nostril rather valvular and fringed. *Teeth*—strong canines on either side of symphysis of the upper jaw, two large and some small lateral conical canine-like ones in the mandible: the villiform teeth on the vomer in a triangular patch, with its base behind. *Fins*—dorsal spines rather strong, increasing in length to the third and fourth which equal $2\frac{1}{3}$ in the height of the body, they slightly decrease in length to the last but one, the twelfth being rather longer than the eleventh; interspinous membrane with a fine prolongation from behind each spine, the highest rays of the dorsal fin as long as those of the anal: lower free rays of pectoral fin longer than the branched ones and equal to two-thirds of the length of the head: ventral reaches the vent: second anal spine the strongest, and as long as the third which is nearly one-third the height of the body: caudal cut square or slightly emarginate. *Scales*—cycloid, some between the rays of the vertical fins: the sub- and inter-opercles, and outer edge of the preopercle are covered with fine scales, as is also the preorbital and suborbital ring of bones, whilst on the cheeks and opercles there are many small ones amongst the rows of large ones, which about equal in size those on the body. *Colours*—reddish, head, chest and base of pectoral fin with black spots: a broad dark band along the middle of the body to the upper half of the caudal fin, becoming brown with black blotches in its last third. A wide yellow band from above the pectoral to the lower half of the caudal fin. Upper edge of the last half of the spinous dorsal black, continued as a black band along the base of the soft dorsal: front edge of anal and outer edge of soft caudal with narrow black margins.

Habitat.—Red Sea, East coast of Africa, seas of India to the Malay Archipelago and beyond. The specimen figured is $5\frac{1}{2}$ inches long, and was captured at the Andaman islands. Bennett observes, "the *Tik kossah* of the Cingalese inhabits rocky situations, seldom exceeds eighteen inches in length, and is a firm-fleshed and wholesome fish."

2. Cirrhites fasciatus.

Cuv. and Val. iii, p. 76, pl. 47; Günther, Catal. ii, p. 73 (not Bennett).

B. vi, D. $\frac{10}{12}$, P. 9+V, V. 1/5, A. $\frac{3}{6}$, C. 15.

Length of head 3/11, of caudal 1/7, height of body 2/5 of the total length. *Eyes*—diameter 2/7 of length of head, 1 diameter from end of snout. The maxilla reaches to below the first third of the orbit. *Teeth*—no canines. *Fins*—dorsal interspinous membrane very deeply emarginate, fourth dorsal spine the highest and equal to about 1/3 the height of the body, from it they decrease to the last but one, which is not so high as the last; soft portion of the fin as high as the spinous: second anal spine the longest, equalling rather more than the highest of the dorsal fin. *Colours*—greyish, becoming white below, it is vertically banded with darker: some white spots on the snout and nape.

Habitat.—Pondicherry.

Genus, 2—Cirrhitichthys, *Bleeker.*

Cirrhitopsis, Gill.

Branchiostegals six. Preopercle denticulated: opercle spinate. Villiform teeth and canines in the jaws: teeth also in the vomer and palatines. A single dorsal fin with ten spines: anal with three: five to seven of the lower pectoral rays unbranched. Scales of moderate size. Air-vessel absent. Pyloric appendages few.

SYNOPSIS OF SPECIES.

1. *Cirrhitichthys aureus*, D. $\frac{10}{12-13}$, P. 7+VI-VII, A. $\frac{3}{6-7}$, L. l. 43, L. tr. 4/12. First dorsal ray prolonged. Rosy, with badly defined blotches: some red spots on the caudal. Seas of India to the Malay Archipelago and beyond.

2. *Cirrhitichthys marmoratus*, D. $\frac{10}{11}$, P. 7+VII, A. $\frac{3}{6}$, L. l. 40, L. tr. 4/10. No elongated dorsal ray. Body and vertical fins with brown spots. Red Sea to the Malay Archipelago and beyond.

1. Cirrhitichthys aureus, Plate XXXV, fig. 5.

Cirrhites aureus, Temm. and Schleg. Faun. Japon. Poiss. p. 15, t. vii, f. 2.
Cirrhitichthys aureus, Günther, Catal. ii, p. 75.
Cirrhitichthys Bleekeri, Day, Sea Fishery Report, No. 207, p. cxci.
Shun-gun, Tam.

B. vi, D. $\frac{10}{12-13}$, P. 7+VI-VII, V. 1/5, A. $\frac{3}{6-7}$, C. 15, L. l. 43, L. tr. 4/12.

Length of head 1/4, of caudal 2/11, height of body 3/10 of the total length. *Eyes*—diameter 2/7 of length of head, $1\frac{1}{4}$ diameters from end of snout, and 2/3 of a diameter apart. Interorbital space concave. The maxilla reaches to below the first third of the orbit. Preopercle denticulated along its vertical border, as is also the shoulder scale: sub- and inter-opercles entire: preorbital nearly as deep as long, entire. A weak opercular spine. *Teeth*—villiform, with an outer rather enlarged row in the upper jaw, and two or more rather curved and conical lateral ones in the mandible: villiform bands on the vomer and palate. *Fins*—dorsal spines rather strong, increasing in length to the fifth and sixth, which equal two-fifths of the height of the body: first ray elongated, otherwise the soft portion only as high as the spinous: pectoral a little longer than the head, the two

upper free rays the longest and reaching to above the anal spines, the free rays may be six or seven in number: ventral not reaching the vent: second anal spine strongest and much the longest, 1/4 higher than the longest in the dorsal fin: caudal slightly emarginate. *Scales*—large on the opercles, cheeks with a few small ones interspersed: none on the preorbital or suborbital ring. *Colours*—rosy, with lightish longitudinal lines and a large ill-defined blotch below the soft dorsal extending half way down the side, in some specimens two more descend from the spinous dorsal: a small dark blotch behind the upper edge of the preopercle. Dorsal and caudal fins more or less banded, soft dorsal darker than the spinous portion, and having a light outer edge: caudal with red spots.

Habitat.—Seas of India to the Malay Archipelago and Japan. It is rather common at Madras, attaining to about 4 inches in length.

This is the species once obtained by Jerdon (M. J. L. and Sc. 1851, p. 132) at Madras, and which he termed *Cirrhites fasciatus*, C.V.

2. Cirrhitichthys marmoratus.

Labrus marmoratus, Lacép. iii, p. 492, pl. v, fig. 3.
Cirrhites maculatus, Lacép. v, p. 3; Cuv. and Val. iii, p. 69.
Cirrhites maculosus, Bennett, Zool. Journ. 1829, p. 38.
Cirrhitichthys maculatus, Günther, Catal. ii, p. 74.

B. vi, D. $\frac{10}{11}$, P. 7+VII, V. 1/5, A. $\frac{3}{6}$, C. 15, L. l. 40, L. tr. 4/10, Vert. 10/16.

Length of head 2/7, of caudal 1/6, height of body 2/7 of the total length. *Eyes*—diameter 1/4 of length of head, $1\frac{1}{3}$ diameters from end of snout, and 3/4 of a diameter apart. The maxilla reaches to below the middle of the orbit. Vertical limb of preopercle serrated: sub- and inter-opercles entire. A broad fringed valve to the posterior nostril. *Teeth*—villiform in the jaws, vomer, and anterior portion of the palatines. *Fins*—dorsal spines increase in length to the fifth and sixth, which equal two-fifths the height of the body and are as long as the rays, the last spine is a little higher than the one preceding it, no prolonged dorsal ray: pectoral reaches as far as the ventral and equals the length of the head excluding the snout: the ventral extends to the anus: second anal spine strongest, longest, and equalling the highest in the dorsal fin. *Colours*—body and vertical fins with brown spots, and a row of dark spots along the base of the dorsal.

Habitat.—Red Sea, seas of India to the Malay Archipelago and beyond.

NATIVE OFFICIAL OF CUDDALORE AND FISHERMEN (1868).

FAMILY, VII—SCORPÆNIDÆ, *Swainson.*

Sclerogenidæ, pt. Owen.

Branchiostegals five to seven: pseudobranchiæ. Body oblong, compressed or subcylindrical. Eyes lateral. Cleft of mouth lateral. Some of the bones of the head armed: suborbital ring articulated with the preopercle. Teeth in villiform bands. A single dorsal fin in two distinct portions: the anal usually similar to the soft dorsal: ventrals thoracic. Body scaled or scaleless. Air-vessel generally present. Pyloric appendages when present, few or in moderate numbers.

Geographical distribution.—Some of these fishes are usually found in most seas.

SYNOPSIS OF GENERA.

1. *Sebastes.* Interorbital space convex, scaled. No occipital groove but usually a few spines on top of head: no skinny appendages. Teeth in jaws, vomer and palatines. A single dorsal fin: no free rays at base of pectoral: articulated fin-rays as a rule branched. Scales present.

2. *Sebastichthys.* Differs from *Sebastes* in having no teeth on the palatines.

3. *Scorpæna.* Interorbital space concave, generally scaleless, with a groove on occiput laterally bounded by spines. Teeth on jaws, vomer and palatines. A single dorsal fin deeply notched (D. 11 | $\frac{1}{9-10}$): no free rays at base of pectoral: articulated fin-rays as a rule branched. Scales present. Fleshy appendages of varying size on head and body.

4. *Scorpænopsis.* Differs from *Scorpæna* in having no teeth on the palatines.

5. *Pterois.* Interorbital space more or less concave: bones of the head armed: no occipital groove. Villiform teeth in jaws and vomer, none on the palatines. A single, deeply-notched dorsal fin (D. 11-12 | $\frac{1}{10-12}$): no free rays at base of pectoral: articulated fin-rays as a rule branched. Scales present. Fleshy appendages on head.

6. *Apistus.* Sharp preorbital and preopercular spines: bones of the head armed. Barbels present. Teeth in jaws, vomer and palate. A single dorsal fin (D. $\frac{14-15}{7-9}$): three anal spines: a free ray at base of pectoral which is elongated: articulated fin-rays as a rule branched. Scales present.

7. *Centropogon.* Sharp preorbital and preopercular spines: bones of the head armed. Teeth in jaws, vomer and palate. A single dorsal fin (D. $\frac{14-15}{7-9}$): three anal spines: no free ray at base of pectoral: articulated fin-rays as a rule branched. Scales present.

8. *Gymnapistus.* Sharp preorbital and preopercular spines: bones of the head armed. Teeth in jaws, vomer and palate. Two dorsal fins, the first with three spines: anal with three spines: no free ray at the base of pectoral: articulated fin-rays as a rule branched. Scales rudimentary or absent.

9. *Amblyapistus.* Head and body strongly compressed: no groove across occiput. Sharp preorbital and preopercular spines: bones of the head armed. Teeth in jaws, vomer and palate. A single dorsal fin (D. $\frac{13-17}{6-10}$): three anal spines: no free rays at base of pectoral: articulated fin-rays branched. Scales rudimentary or absent.

10. *Micropus.* Preorbital and preopercle with spines, also the sub- and inter-opercles: other bones of the head armed. No groove across occiput. Villiform teeth in the jaws only. A single or two dorsal fins with less spines than rays: two weak anal spines: no free rays at base of pectoral: ventral almost rudimentary. Articulated fin-rays branched. Scaleless.

11. *Minous.* Head large, a groove across occiput. Sharp preorbital and preopercular spines: bones of the head armed. Teeth in jaws and vomer, none on the palatines. A single dorsal fin (D. $\frac{9-11}{12-9}$): anal spines, if present, badly developed: pectoral with a free ray at its base. Articulated fin-rays unbranched. Scaleless.

12. *Cocotropus.* Head and body strongly compressed: no groove on occiput. Blunt preorbital and preopercular spines: bones of head armed. Teeth in jaws and vomer, none on palatines. A single dorsal fin (D. $\frac{14-15}{9-10}$): two weak anal spines: pectoral without free rays at its base. Articulated fin-rays unbranched. Scaleless.

13. *Pelor.* Head irregularly shaped, it and body with many skinny appendages: a groove across occiput. Bones of the head armed. Villiform teeth on jaws, vomer, and palatines. Articulated fin-rays generally branched. Scaleless.

14. *Choridactylus.* Head and body compressed: a groove on occiput. Sharp preorbital and preopercular spines: bones of the head armed. Teeth in the jaws, none on vomer or palate. A single dorsal fin (D. $\frac{13}{9}$): two anal spines: three free rays at base of pectoral. Articulated fin-rays branched. Scaleless.

15. *Synancidium.* Head monstrous and irregularly shaped. Bones of the head with blunt spines. Teeth in jaws and vomer but not on the palate. A single dorsal fin (D. $\frac{13}{6-9}$): three anal spines: no free rays at base of pectoral. Articulated fin-rays branched. Scaleless.

16. *Synanceia.* Head monstrous, irregularly shaped. Bones of the head spineless. Teeth in jaws, none on vomer or palate. A single dorsal fin (D. $\frac{13-16}{5-6}$): three anal spines: no free rays at base of pectoral. Articulated fin-rays branched. Scaleless.

17. *Pseudosynanceia.*. Eyes directed upwards. Villiform teeth in jaws and vomer. Dorsal spines strong (D. $\frac{16}{5}$) : three anal spines : no free ray at base of pectoral. Articulated fin-rays unbranched. Sealeless.

18. *Polycaulis.* Body anteriorly sub-cylindrical, posteriorly compressed. Eyes directed somewhat upwards. Preopercle armed. Teeth villiform in the jaws, none on vomer or palate. A single dorsal fin (D. $\frac{9-16}{5-14}$) : no anal spines (A. 11-15) : no free rays at base of the pectoral fin. Articulated fin-rays unbranched. Sealeless.

M. Sauvage in his paper on *Triglidæ*, Cuv. and Val. (Sep. 1873) divides them as follows : 1, SCORPÆNIDÆ ; 2, PLATYCEPHALIDÆ ; 3, TRIGLIDÆ ; and subdivides the first family thus :

SCORPÆNIDÆ.
- *a.* Body covered with ordinary scales as *Sebastes, Scorpæna, Pterois*, and group of *Apistus* —SCORPÆNI.
- *b.* Body sealeless or with spinate scales, as *Synancidium, Synanceia, Minous, Pelor*, and group of *Cottes*, &c.—COTTINI.

Dr. Günther, "Fishes of Zanzibar," (p. xiv, errata) observes, "*before* SYNANCEIA insert Family COTTIDÆ," &c. I must refer to M. Sauvage's paper for my reasons for placing all the foregoing Genera in the present Family.

Genus, 1—SEBASTES, *Cuv. and Val.*

Branchiostegals seven : pseudobranchiæ. Head and body somewhat compressed. No groove on the occiput, usually a few small spines ; preopercle armed. Villiform teeth on the jaws, vomer and palatines. Fins not elongated : a single dorsal, having the spinous portion more or less separated from the soft by a notch, spines twelve to fourteen : anal not elongated, with three spines : no free rays to the pectoral fin. Articulated fin-rays branched. Scales present and of moderate or small size, extending as far forwards as the orbit or even beyond : no skinny appendages. Air-vessel, as a rule, present. Pyloric appendages few or in moderate numbers.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Sebastes Stoliczkæ.* D. $\frac{14}{10}$, A. $\frac{3}{6}$, L. l. 35. No spines on top of head. Reddish, marbled with brown : fins spotted or blotched. Nicobars.

1. Sebastes Stoliczkæ, Plate XXXVI, fig. 1.

B. vii, D. $\frac{14}{10}$, P. 14, V. 1/5, A. $\frac{3}{6}$, C. 16, L. l. 35, L. r. $\frac{40}{36}$, L. tr. 5/14.

Length of head 3/10, of caudal 2/13, height of body 3/11 of the total length. *Eyes*—diameter $3\frac{3}{4}$ in length of head, 3/4 of a diameter from end of snout, and also apart. Height of head equals its length without the snout. Interorbital space convex. The maxilla reaches to below the last third of the orbit. Vertical limb of preopercle serrated, and having three strong anteriorly-directed spines along its horizontal border : sub- and inter-opercles entire. No spines on the head : no groove below the eyes : a moderately strong opercular spine. A nasal tentacle nearly half the diameter of the orbit in length. *Teeth*—villiform in jaws, vomer, and palate. *Fins*—dorsal spines strong, increasing in length to the fourth which is more than half ($1\frac{3}{4}$) the height of the body, they gradually decrease to the last which equals three-fourths of the diameter of the orbit in length, the rays are almost of the same height as the spines. Pectoral as long as the head behind the front third of the eye and longer than the ventral which just reaches the vent : second anal spine much the strongest and longest, equalling the length of the pectoral fin : caudal rounded. *Scales*—finely ctenoid, those on the head and to below the third dorsal spine much smaller than those on the body : upper surface of head sealed as far as the snout, also along the suborbital ring of bones and on the cheeks and opercles : $4\frac{1}{2}$ rows between lateral-line and base of sixth dorsal spine : 10 between the ventral and the lateral-line. *Colours*—reddish, marbled with brown : some dark bands radiate from the eye : all the fins spotted, blotched and banded with brown or black.

Habitat.—Nicobars, from whence the specimen figured (life-size) was brought by the late Dr. Stoliczka.

Genus, 2—SEBASTICHTHYS, *Gill.*

Sebastodes, Ayres.

Differs from Sebastes in having no palatine teeth.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Sebastichthys strongia*, D. 11-12 | $\frac{1}{9}$, A. $\frac{3}{5}$, L. l. 45. Seas of India to the Malay Archipelago.

1. Sebastichthys strongia.

Scorpæna strongiæ, Cuv. and Val. iv, p. 323; Quoy and Gaim. Voy. Astrol. Poissons, p. 688, pl. xi, f. 2 ; Less. Voy. Duperr. Zool. Poiss. p. 213; Klunz. Verh. z. b. Ges. Wien, 1870, p. 803.

Scorpæna cyanostigma, Bleeker, Buru, p. 400.

Sebastes strongensis, Günther, Catal. ii, p. 105.

B. vi, D. 11-12 | $\frac{1}{9}$, P. 19, V. 1/5, A. $\frac{3}{5}$, C. 15, L. l. 45, L. tr. 5/16.

Length of head 1/3, of pectoral 1/4, of caudal 2/11, height of body nearly 1/3 of the total length. *Eyes*—diameter a little more than 1/3 of length of head, 3/4 of a diameter from end of snout, 1/2 a diameter apart. Supraorbital ridge spined : two spinate lines given off posteriorly from the orbit, one towards the occiput, the other towards the lateral-line. A sharp spine on nostril : anterior edge of preorbital with obtuse spines. Ridge

below the orbit to the angle of the preopercle also spiny, and two more strong spines on the lower margin of the preopercle. Three strong spines on preorbital and a very strong one at shoulder. Two tentacles above the orbit and several more about the head. The maxilla reaches to under the posterior third of the orbit. *Teeth*—villiform in both jaws, and also on the vomer. *Fins*—the lower eight rays of the pectoral with free extremities. Dorsal spines strong, increasing in length to the ninth. Second dorsal rather lower than the first. Second anal spine longest and strongest: caudal rounded. *Scales*—cover the body, the occiput, cheeks and opercles, also the bases of the soft rays of the fins. *Lateral-line*—in single tubes, with here and there tentacles. *Colours*—brownish, banded with darker, the first passing downwards through the eye: a large brown spot on opercle: fins irregularly banded in dotted lines.

Habitat.—Ceylon, Andamans, Malay Archipelago.

Genus, 3—SCORPÆNA, *Artedi.*

Scorpænopsis, Heck.; *Neosebastes*, Guichenot; *Pseudomonopterus*, Bleeker.

Branchiostegals seven: pseudobranchiæ. Head large, with a scaleless groove on the occiput, armed with spines and usually with skinny flaps. Villiform teeth on the jaws, vomer, and palatines. A single dorsal fin deeply notched, dividing the two portions, having twelve spines, and three in the anal, which latter fin is not elongated: pectoral large, without free rays. Air-vessel absent. Pyloric appendages few.

Geographical distribution.—Tropical seas, also in the Mediterranean and Atlantic coasts of America.

SYNOPSIS OF SPECIES.

1. *Scorpæna haplodactylus*, D. 11 | $\frac{1}{9}$, A. $\frac{3}{5}$, L. r. 43, L. tr. 6/22. An orbital tentacle. Brownish-black, banded and marbled. Andamans and Malay Archipelago.

2. *Scorpæna armata*, D. 11 | $\frac{1}{9}$, A. $\frac{3}{5}$, L. l. 35, L. tr. 9/19. No orbital tentacle. Roseate brown, with darker blotches. East Indies.

1. Scorpæna haplodactylus, Plate XXXVI, fig. 2.

Scorpæna aplodactylus, Bleeker, Ceram. ii, p. 698.
Scorpæna haplodactylus, Günther, Catal. ii, p. 117; Kner, Novara Fische, p. 116.

B. vii, D. 11 | $\frac{1}{9}$, P. 5+XII, V. 1/5, A. $\frac{3}{5}$, C. 15, L. l. 26, L. r. $\frac{44}{42}$, L. tr. 6/22.

Length of head 1/3, of pectoral 1/4, of caudal 1/7, height of body 3/10 of the total length. *Eyes*—diameter 1/4 of length of head, $1\frac{1}{3}$ diameters from the end of snout, and 1/2 a diameter apart. Width of head equals three-fourths of its length. The maxilla reaches to below the centre of the orbit. Interorbital space deeply concave, no groove below the eyes. Two spines on the posterior-superior edge of the orbit, the hind one of which is furnished with a tentacle. Three strong spines on the occipital and the same number on the temporal ridge, and one intermediate small spine. A strong turbinal spine: a suborbital spinate ridge: three strong spines on the vertical limb of the preopercle and two blunt ones along its horizontal border: two strong opercular spines. Several fleshy tentacles about the head. A strong spine above the base of the pectoral fin on the shoulder girdle. *Teeth*—villiform in the jaws, in a narrow V-shaped band on the vomer, and a few on the anterior end of the palatines. *Fins*—dorsal spines increase in length to the fourth, which equals half the height of the body, from it they decrease in length to the eleventh, between which and the next exists a deep notch, the twelfth spine twice as high as the eleventh: soft dorsal slightly higher than the spinous. Pectoral equals the length of the head behind the middle of the eyes, its twelve lower rays unbranched: second anal spine the strongest and longest, equalling half the height of the body: caudal rounded. *Scales*—on the cheeks, upper and hind edge of the opercles, and a few fleshy tentacles along the lateral-line. *Colours*—brownish-black, banded and marbled with darker: anal having a broad band along its basal half: one vertical band at the base of the caudal, another along its centre, and a dark margin edged with white: dorsal with brown marks.

Habitat.—Andamans (where the specimen figured life-size was procured) to the Malay Archipelago and beyond.

2. Scorpæna armata.

Sauvage, Nouv. Arch. du Museum, p. 49, t. ix, pl. 6, fig. 1.

B. vii, D. 11 | $\frac{1}{9}$, P. 6+XII, V. 1/5, A. $\frac{3}{5}$, C. 13, L. l. 35, L. tr. 9/19.

Length of head 4/11, of caudal 2/11, height of body 1/3 of the total length. *Eyes*—diameter 1/4 of length of head, $1\frac{1}{4}$ diameters from end of snout, and 3/4 of a diameter apart. The maxilla reaches to nearly below the hind edge of the orbit. Interorbital space very concave, with a quadrangular fossa, along which are two low ridges that terminate posteriorly in two spines: a deep groove below the eyes. Two or three spines along the upper margin of the orbit: a turbinal spine: two strong ones on the preorbital from which a ridge proceeds to a spine in the middle of the vertical border of the preopercle, below which are three smaller ones. Opercle with two spines. Occipital and temporal ridges spinate. *Teeth*—villiform in jaws, in a V-shaped band on the vomer, and a large band on the palatines. *Fins*—fifth dorsal spine rather above half the height of the body: pectorals and ventrals of the same length passing to slightly beyond the anus: third anal spine the longest, exceeding the highest in the dorsal fin: caudal slightly rounded. *Scales*—over body and head, none between the eyes. *Colours*—roseate brown, with darker blotches and a few yellowish-white spots: head spotted with black. Fins yellowish-brown, spotted with darker, sometimes forming lines.

Habitat.—Two specimens, obtained in the East Indies, were presented to the Paris Museum by M. Bonaré.

Genus, 4—Scorpænopsis, *Heckel.*

Scorpænichthys and *Parascorpæna*, Bleeker.

Differs from Scorpæna in having no palatine teeth.

Geographical distribution.—Tropical seas, also with those of the last genus.

SYNOPSIS OF SPECIES.

1. *Scorpænopsis Guamensis*, D. 12 | $\frac{1}{9}$, P. 9+X, A. $\frac{3}{5}$, L. r. 43. No orbital tentacle. Scales over cheeks and opercles. Brown, marbled with darker. East Indies to the Malay Archipelago.

2. *Scorpænopsis cirrhosa*, D. 11 | $\frac{1}{10}$, P. 6+XII, A. $\frac{3}{5}$, L. r. 56. Orbital tentacle, if present, small. Head scaleless. Pinkish brown marbled with darker.

3. *Scorpænopsis oxycephala*, D. 11 | $\frac{1}{10}$, P. 6+XII, A. $\frac{3}{5}$, L. r. 46. Orbital tentacle well developed. Scales on the upper portions of opercle and preopercle. Reddish brown, spotted and blotched with darker. Nicobars to the Malay Archipelago and beyond.

4. *Scorpænopsis rosea*, D. 11 | $\frac{1}{10}$, P. 6+XII, A. $\frac{3}{5}$, L. r. 43. An orbital tentacle. Scales on upper portion of opercles. Reddish brown, marbled. Seas of India.

5. *Scorpænopsis venosa*, D. 11 | $\frac{1}{9}$, P. 6+XII, A. $\frac{3}{5}$, L. l. 38. Apparently no orbital tentacle. Head scaleless. Reddish brown blotched with darker. Seas of India.

1. Scorpænopsis Guamensis.

Scorpæna Guamensis, Quoy and Gaim. Voy. Frey. Zool. p. 326.
? *Scorpæna polylepis*, Bleeker, Nat. Tyds. Ned. Ind. 1851, ii, p. 173.
Sebastes polylepis, Günther, Catal. ii, p. 106.*

B. vii, D. 12 | $\frac{1}{9}$, P. 9+X, V. 1/5, A. $\frac{3}{5}$, C. 13, L. r. 43.

Length of head 1/3, of caudal 1/5, height of body 2/7 of the total length. *Eyes*—diameter 2/7 of length of head, 1 diameter from end of snout, and 3/4 of a diameter apart. Interorbital space concave. No groove beneath the eyes. Supraorbital edge spinate. No orbital tentacle. The maxilla reaches to below the middle of the eye. Spines on head acute. *Teeth*—villiform in jaws and on the vomer. *Fins*—highest dorsal spines equal half of the height of the body. *Scales*—present on cheeks and opercles. *Colours*—brown marbled with darker.

Habitat.—Malay Archipelago, and said to have been brought from the East Indies.

2. Scorpænopsis cirrhosa.†

Perca cirrhosa, Thunb. Nya Handl. Stockh. xiv, 1793, p. 199, pl. 7, fig. 2.
Scorpæna cirrhosa, Cuv. and Val. iv, p. 318; Günther, Catal. ii, p. 120; Klunz. Verh. z. b. Ges. Wien, 1870, p. 801.
Scorpæna neglecta, Temm. and Schleg. p. 42, pl. 17, fig. 2, 3; Bleeker, Verh. Bat. Gen. xxvi, p. 79.
Scorpæna barbata, Rüpp. N. W. Fische, p. 105, t. 27, fig. 1.

B. vii, D. 11 | $\frac{1}{10}$, P. 6+XII, V. 1/5, A. $\frac{3}{5}$, C. 13, L. r. 56.

Length of head 1/3, of caudal 1/6, height of body 3/10 of the total length. *Eyes*—diameter 1/5 of length of head, $1\frac{1}{2}$ diameters from end of snout, and 2/3 of a diameter apart. Interorbital space deeply concave, with two low ridges along its whole extent which do not end in spines: a deep groove below the anterior edge of the orbit: a shallow groove over occiput: occipital and temporal ridges strongly spinate. Two strong spines along the upper edge of the orbit. Sometimes an orbital tentacle of small size, which is however mostly absent. A spinate ridge from the preorbital across the cheeks, preopercle spinate: opercle with two spines. *Tentacles*—besides the orbital one, there are many more about the head and a very large one above the angle of the mouth: there are also some on the body. *Teeth*—in jaws and vomer, none on the palate. *Fins*—dorsal spines increase in length to the fourth, which is half as high as the body, and usually shorter than the second of the anal, which equals half the length of the head: ventral reaches the anus: caudal cut nearly square. *Scales*—none on the head. *Colours*—Pinkish brown marbled with darker: fins spotted and blotched.

Habitat.—West coast of Africa, seas of India to Malay Archipelago and beyond.

3. Scorpænopsis oxycephala, Plate XXXVI, fig. 3.

Scorpæna oxycephalus, Bleeker, Sclerop. p. 20, and Verh. Bat. Gen. xxii, Sclerop. p. 7; Kner, Novara Fische, p. 116.
Scorpæna cirrhosa, Günther, Catal. ii, p. 120 (in part).
Scorpænopsis oxycephala, Sauvage, Nov. Arch. Mus. t. ix, p. 52, pl. 6. fig. 3 and 3*a*.

B. vii, D. 11 | $\frac{1}{10}$, P. 6+XII, V. 1/5, A. $\frac{3}{5}$, C. 13, L. r. $\frac{52}{46}$, L. tr. 7/22.

* Specimens marked *Sebastes polylepis*, B. M. Catal. ii, p. 107, belong to this species, under which designation they are now placed.

† The specimen of *Scorpæna polyprion*, B. M. Catal. ii, p. 115, recorded as "*d.* Half grown, Ceylon, presented by Captain Gascoigne," appears to belong to this species.

Length of head 4/13, of caudal 2/11, height of body 4/17 of the total length. *Eyes*—diameter 1/5 of length of head, $1\frac{1}{2}$ diameters from end of snout, and 1 apart. Interorbital space deeply concave, with two low ridges along its whole extent, and which do not end in spines, between them anteriorly is a third: a deep groove below the front third of the orbit continued as a shallow one below the eye: a groove across the occiput having one spine anterior to it and two more belonging to the occipital ridge posterior to it. Three strong spines along the upper edge of the orbit with a tentacle between the last two. A strong turbinal spine. A tentacle to the front nostril. Preorbital with ridges in a star-shape, about seven in number, and ending in spines: a spinate ridge across the cheeks to a strong spine in the centre of the vertical border of the preopercle, which has two more below it and one blunt one along its lower limb: opercle with two spines. Temporal ridge spined and one spine between it and the occipital ridge. A spine on the shoulder girdle just above the base of the pectoral fin. *Tentacles*—besides those enumerated, there exists a large one above the angle of the mouth, some small ones along the margin of the preopercle, a few also on the lateral-line and on some of the body scales. *Teeth*—villiform in jaws and vomer. *Fins*—dorsal spines rather strong, the third very slightly longer than the fourth, and equal to two-fifths of the height of the body and about as long as the rays: pectoral as long as the head without the snout and reaching as far as the ventral: second anal spine much the strongest and equal to the length of the head behind the last third of the eye: caudal cut square. *Scales*—present on the upper portions of the opercle and preopercle, eight rows between sixth dorsal spine and lateral-line. *Colours*—reddish, clouded with brown, and having a few blackish spots: a dark band commences in the upper half of the interspinous membrane between the second and third dorsal spines, and passing along the upper third of the fin, descends between the sixth and seventh on to the back: many blotches on the fins: a dark band descends over the last half of the caudal: three narrow dark horizontal bands go across the lower half of the anal: undivided pectoral rays spotted; ventral with brown spots.

In a young specimen ($2\frac{1}{2}$ inches long) captured along with the one described above, the eye is comparatively much larger, the cheeks and opercles are scaled, there are two supraorbital tentacles and a short one on the upper angle of the eye, whilst the body is comparatively higher.

Habitat.—Nicobars to the Malay Archipelago and beyond: the specimen figured (over 6 inches in length) was obtained at the Nicobars.

4. Scorpænopsis rosea, Plate XXXVI, fig. 4.

Scorpæna rosea, Day, Proc. Zool. Soc. 1867, p. 703.

B. vii, D. 11 | $\frac{1}{9\text{-}10}$, P. 6+XII, V. 1/5, A. $\frac{3}{5}$, C. 15, L. l. 43, L. tr. 7/18.

Length of head 1/5, of pectoral 1/4, of caudal 1/5, height of body 1/3 of the total length. *Eyes*—somewhat elevated, with a deep groove below, and anterior and posterior depressions: interorbital space deeply concave, with an elevated smooth ridge on either side: diameter of eyes 1/4 of length of head, $1\frac{3}{4}$ from end of snout, and 3/4 of a diameter apart. Snout rather elevated, a transverse depression between it and the orbit. The maxilla reaches to below the centre of the orbit: lower jaw the longer. A sharp turbinal spine; a broad fleshy fringed tentacle to the anterior nostril. Above the angle of the preopercle is a ridge with five more backwardly directed spines. Along the angle and lower edge of the preopercle are three denticulations, the superior strong and sharp, the others blunted, also three fleshy tentacles along its border and one on its surface. Interopercle with a blunt spine and tentacle. Opercle with a central bony ridge ending in two spines. Temporal ridge containing three spines, and occipital one likewise spiny; whilst there is one spine between it and the ridge below it. Orbit with a strong spine at its posterior-superior—and another at its superior—edge, the last with a long wide tentacle at its base. Several fleshy tentacles exist on the snout, a large one at the angle of the mouth, and two on the end of the upper jaw: also three rather large ones on the lower jaw. *Teeth*—villiform, a V-shaped patch on the vomer, none on the palatines. *Fins*—dorsal spines moderately strong, the third the longest, interspinous membrane rather deeply cleft and extended beyond each spine. Pectoral with its lowest twelve rays unbranched and minute fleshy appendages attached to them. Second and third anal spines of equal length, the former much the stronger. Caudal cut nearly square. *Scales*—present, some on the upper part of the opercle, head otherwise scaleless. Lateral-line in 23 or 24 tubes. *Colours*—rosy, marbled with greyish: one or two irregular vertical grey bands on the caudal fin: dorsal, anal, and ventral also banded: pectoral with numerous dark spots.

S. Mauritiana, C. V. appears very similar, it has 43 rows of scales above the lateral-line and 40 below it. Six branched pectoral rays but only 10 simple ones.

Habitat.—Madras.

5. Scorpænopsis venosa.

Scorpæna mooroo-bontoo, Russell, Fish. Vizag. i, p. 44, pl. 56.
Scorpæna venosa, Cuv. and Val. iv, p. 317; Swainson, Fish. ii, p. 266.

B. vii, D. 11 | $\frac{1}{9}$, P. 18, V. 1/5, A. $\frac{3}{5}$, C. 16, L. l. 38.

Length of head 1/3 of the total length. *Eyes*—rather above one diameter from the end of snout and also one apart. The maxilla reaches to below the last third of the eye. Interorbital space very concave with two longitudinal ridges that end posteriorly in spines: a groove before the eyes: a quadrangular space on the vertex bordered by spines: turbinal and preorbital spines, a spiny ridge across the cheeks: vertical limb of preopercle

spinate: occipital and temporal ridges spinate. *Tentacles*—none apparent over the orbit (?): very distinct on lower jaw and different parts of the head. Valenciennes observes that its most remarkable character is that all the skin of the head between the spines is as if it were veined with small scooped out lines which join on all sides, and thus form a network which has the appearance of scales. *Teeth*—none on the palate. *Fins*—fourth dorsal spine the longest and equal in length to the second of the anal which is 2/5 of the length of the head. *Scales*—none on head, those on body oblong, ctenoid with a single row of minute spines along its marginal border. *Colours*—"head and body dark, with a mixture of dull red: the throat and belly are of a pink colour. The fins irregularly streaked black and red: the ventral at its root is pink like the belly."—(Russell.)

M. Sauvage, who has kindly compared Valenciennes' type specimen for me with a drawing I made of *S. rosea*, has furnished me with the additional information detailed above. He likewise observes "*S. venosa* differs from *S. rosea* (according to your figure) by the head being more elongated: the body also more elongated and the dorsal spines not being so high."

Habitat—Coromandel coast of India.

Genus, 5—PTEROIS, *Cuv.*

Macrochyrus, *Pteroleptus*, *Pteropterus* and *Brachyrus*, Swainson.

Branchiostegals seven: pseudobranchiæ. Head rather large, armed with spines and having skinny flaps: no occipital groove. Villiform teeth in jaws and on vomer, none on the palate. A single deeply notched dorsal fin, having from twelve to thirteen spines: anal with two or three spines and few rays: rays, and sometimes spines, elongated: no pectoral appendages. Air-vessel large. Pyloric appendages few.

Geographical distribution.—Red Sea, coasts of Africa, through the seas of India to the Malay Archipelago and Polynesia.

It does not appear that any very great value can be placed on the comparative length of the dorsal spines, or pectoral rays in this Genus of Fishes, as they are subject to considerable modifications, some being dependant upon age, and others seem to be subject to variation in specimens of the same species. It has yet to be ascertained whether the orbital tentacle is equally developed in both sexes.

SYNOPSIS OF SPECIES.

1. *Pterois Russellii*, D. 12 | $\frac{1}{11\text{-}12}$, L. r. $\frac{71}{66}$. A short supraorbital tentacle. Interorbital space and nape scaled. Caudal unspotted. No white spot in axilla. Pectoral grey, with its two upper rays spotted. Seas of India to the Malay Archipelago.
2. *Pterois miles*, D. 12 | $\frac{1}{10\text{-}11}$, L. r. 92. A short supraorbital tentacle. Interorbital space and nape scaled. Dorsal, caudal, and anal spotted. A white spot in the axilla. Seas of India.
3. *Pterois zebra*, D. 12 | $\frac{1}{11}$, L. r. $\frac{55}{50}$. A long supraorbital tentacle. Interorbital space scaleless. Dorsal, caudal, pectoral and anal spotted. A white spot in the axilla.
4. *Pterois volitans*, D. 12 | $\frac{1}{10\text{-}11}$, L. r. 90. A long supraorbital tentacle. Interorbital space and nape scaleless, or with rudimentary scales. Dorsal, caudal and anal spotted. A white spot in the axilla. Red Sea, East coast of Africa, seas of India to Australia.
5. *Pterois cincta*, D. 11 | $\frac{1}{11}$, L. r. 45. A long supraorbital tentacle. Nape scaled. Soft dorsal, caudal and anal spotted. No white spot in axilla. Red Sea, seas of India and beyond..

1. **Pterois Russellii**, Plate XXXVI, fig. 5.

Gasterosteus volitans, Russell, Fish. Vizag. ii, p. 25, pl. 133 *(kodipungi)*, (not *G. volitans*, Linn.)
Pterois Russellii, (Van Hass.) Bennett, Proc. Zool. Soc. 1831, p. 128.
Pteroleptus longicauda, Swains. Fish. ii, p. 264.
Pterois miles, Cantor, Catal. p. 42 (not Bennett).
Pterois kodipungi, (Russell) Bleeker, Banka, p. 450; Günther, Catal. ii, p. 124.
Pseudomonopterus kodipungi, Bleeker, Fish. Madagascar, p. 87.

B. vii, D. 12 | $\frac{1}{11\text{-}12}$, P. 13, V. 1/5, A. $\frac{3}{7\text{-}8}$, C. 14, L. r. $\frac{71}{66}$, L. tr. 11/33.

Length of head 1/4, of caudal 2/7, height of body 1/4 of the total length. *Eyes*—diameter 2/9 to 1/5 of the length of head, $1\frac{3}{4}$ diameters from the end of snout, and 3/4 of a diameter apart. The maxilla reaches to below the middle of the orbit. Preorbital with a spinate ridge traversing its centre, and continued over the cheek to the upper preopercular spine, below which latter there exist two or three more on its vertical, and two along its horizontal edge. A spine at the posterior-superior angle of the orbit and a short supraorbital tentacle. Interorbital space deeply concave, it and the occiput scaled. Occipital and temporal ridges spiny; a small turbinal spine. A rather long fleshy tentacle at the angle of the preorbital, one at the anterior nostril, and several more about the head. *Teeth*—villiform in jaws and vomer. *Fins*—dorsal spines increase in length to the fifth which equals the height of the body and is longer than the rays: the pectoral, with its membrane, especially between its four upper rays, deeply cleft, it reaches a little beyond the base of the caudal, or even further: ventral extends to the anal rays: third anal spine the longest, equalling the length of the snout: caudal pointed. *Scales*—eleven rows between lateral-line and 6th dorsal spine. *Colours*—reddish, with from eleven to twelve broad dark vertical bands, with intermediate narrow ones. A black spot on the shoulder behind the opercle, no

white spot in the axilla. Pectoral grey, its upper two rays with black spots, its lowest five pinkish, in the adult all are spotted: ventrals grey, with obscurely marked white spots: dorsal spines grey, or white annulated with grey, soft dorsal, caudal, and anal flesh-coloured without spots, but having in adults a narrow black edge.

Bennett observes that Russell's fish, *Gasterosteus volitans*, is identical with *P. volitans* in Sir S. Raffles' life, but not with *P. volitans*, Linn.

Habitat.—Seas of India, Mauritius to the Malay Archipelago. Very common in Madras, the specimen figured is 7 inches long, the largest obtained $11\frac{1}{2}$ inches. Jerdon (M. J. L. and Sc. 1851, p. 141) observes this fish is termed *Sin toumbi*, Tam. at Madras.

2. Pterois miles, Plate XXXVII, fig. 2.

Scorpæna miles, Bennett, Fish. Ceylon, p. 9, pl. 9.

Pterois miles, Günther, Catal. ii, pp. 125, 520; Day, Fish. Malabar, p. 40.

Pterois muricata, Cuv. and Val. iv, p. 363; Rüppell, N. W. Fische, p. 107; Kner, Novara Fische, p. 118; Klunz, Verh. z. b. Ges. Wien, 1870, p. 807.

? *Pterois geniserra*, Cuv. and Val. iv, p. 666.

Macrochyrus miles, Swainson, Fishes, ii, p. 264.

Kurrun toombi, Tam. "Flying dragon."

B. vii, D. 12 | $\frac{1}{10-11}$, P. 14, V. 1/5, A. $\frac{3}{6-7}$, C. 14, L. r. 92, L. tr. 12/-, Vert. 10/14.

Length of head 2/9, of pectoral 4/11, of caudal 2/9, height of body 2/7 of the total length. *Eyes*—diameter 2/7 to 1/4 of the length of head, $1\frac{1}{2}$ diameters from the end of snout, and 1 apart. The maxilla reaches to below the front edge of the orbit. Preorbital covered in its lower third with spinate elevations which are continued across the cheeks to the angle of the preopercle where they end in three spines in the young or clusters of them in the adult: two strong turbinal spines: upper edge of orbit spinate as is also the temporal ridge as far as the commencement of the lateral-line: interorbital space convex but not very deeply so: occipital ridge spinate, most strongly so posteriorly where it ends in a flattened blade-like spine which has several more near its base. A short orbital tentacle, one at the anterior nostril, a long preorbital one over angle of the mouth, and other short ones about the head. *Teeth*—villiform in jaws and vomer. *Fins*—dorsal spines moderately strong, highest from the 6th to the 12th, which equal the height of the body and are longer than the rays: pectoral with the inter-radial membrane most deeply cleft between the first three rays, and reaching to below the end of the base of the dorsal fin: ventral reaches the anal, the third spine of which last fin is the longest and equal to the length of the snout: caudal wedge-shaped. *Scales*—present in the interorbital space and on the nape. *Colours*—red, with many dark vertical bands much wider than the ground colour, in fact, in the first two-thirds of the body the ground colour appears like narrow light bands: in the last third of the body the dark bands are wider apart with from one to three intermediate narrow ones. Head banded, bands mostly radiating from the eye, two of an S-shape over the chest. A white spot surrounded by black in the axilla. Dorsal spines with from five to six dark rings: soft dorsal, caudal, and anal covered with small black spots: pectoral with large black blotches on a lighter ground: ventral nearly black, with white and light brown spots.

Habitat.—From the Red Sea through those of India, to the Malay Archipelago and beyond. The largest specimen captured at Madras measured 14 inches in length. Klunzinger considers this another form of *P. volitans*, from which it may be distinguished by its scaled nape, comparatively short pectoral, and the numerous spines on its head. In a specimen 9 inches long the pectoral reaches the root of the caudal.

3. Pterois zebra.

Cuv. and Val. iv, p. 367; Bleeker, Amb. and Ceram. p. 265; Quoy and Gaim. Voy. Uranie, p. 329, and Voy. Astrol. Poiss. p. 692, pl. xi, f. 6; Günther, Catal. ii, p. 126.

Brachyurus zebra, Swainson, Fishes, ii, p. 264.

Pseudomonopterus zebra, Bleeker, Fish. Madag. p. 87.

B. vii, D. 12 | $\frac{1}{11}$, P. 17, V. 1/5, A. $\frac{3}{6-7}$, C. 14, L. r. $\frac{55}{50}$, L. tr. 9/.

Length of head 2/7, of caudal 2/9, height of body 2/7 of the total length. *Eyes*—diameter 2/7 of length of head, (in a specimen $3\frac{1}{2}$ inches long,) 1 diameter from end of snout, and 2/3 of a diameter apart. Interorbital space deeply concave, traversed by two low ridges which posteriorly end in a strong spine: interorbital space scaleless. The maxilla reaches to below the first third of the orbit. Preopercle with three spines on its vertical border at and above its angle: turbinal spines present. Two or three spines along the upper edge of the orbit, its hind margin likewise serrated. Ridges in a stellate form on the preorbital, one of which is continued backwards in a spinate form across the suborbitals and cheeks to the superior preopercular spine: three strong spines on the occipital and four along the temporal ridge. A long orbital tentacle equalling more than half the length of the head: fleshy tentacles along the lower edge of the preorbital, the hind one over the angle of the mouth being very large. *Teeth*—villiform in jaws and vomer. *Fins*—dorsal spines increase in length to the seventh, remaining about of equal height to the tenth, or as long as the height of the body and higher than the rays: pectoral with 17 rays, the upper four having filamentous prolongations, and reaching as far as the base of the caudal: ventrals reach the anal spines, the third of which is slightly the longest, and equal to $1\frac{1}{3}$ diameters of the orbit in length: caudal wedge-shaped. *Colours*—body vertically banded with narrow intermediate ones: a black blotch with a white central spot in the axilla: dorsal spines annulated with black: soft

dorsal and anal with black spots in irregular lines: four or five sinuous vertical bands on the caudal: pectoral and ventral with black transverse bands and lines as wide or wider than the ground-colour.

Habitat.—Seas of India to the Malay Archipelago and beyond. I have this species from the Andamans.

4. Pterois volitans, Plate XXXVII, fig. 1.

Gasterosteus volitans, Linn. Syst. Nat. XII, i, p. 491.

Scorpæna volitans, Bloch, t. 184; Gmel. Linn. p. 1217; Bl. Schn. p. 193; Lacép. iii, p. 289; Gronov. ed. Gray, p. 119; Bennett, Fish. Ceylon, p. I, pl. 1.

Scorpæna mahe, Lacép. iii, p. 278.

Pterois volitans, Cuv. and Val. iv, p. 352, pl. 88; Swainson, Fishes, ii, p. 264; Bleeker, Sclerop. p. 8; Rüppell, N. W. Fische, p. 107; Günther, Catal. ii, p. 122; Day, Fishes of Malabar, p. 38; Klunz. Verh. z. b. Ges. Wien, 1870, p. 806.

Pseudomonopterus volitans, Bleeker, Fish. Madagas. p. 87.

Pterois à nageoires lie de vin, Liénard, Nat. Hist. Soc. Mauritius, 1839, p. 33.

Purrooah, Mal.: *Cheeb-ta-ta-dah*, Andam.

B. vii, D. 12 | $\frac{1}{10-11}$, P. 14, V. 1/5, A. $\frac{2-3}{7-6}$, C. 14, L. r. 90, L. tr. 13/, Cæc. pyl. 3, Vert. 10/14.

Length of head 3/11 to 3/13, of caudal 3/11 to 4/13, height of body 4/13 to 1/3 of the total length. *Eyes*—diameter 1/4 to 2/9 of length of head, $1\frac{1}{2}$ to $1\frac{1}{3}$ diameters from end of snout, and 1 apart. Interorbital space deeply concave, it and the nape scaleless, or with some very rudimentary scales: it is traversed by two low ridges which do not terminate posteriorly in spines. The maxilla reaches to below the front edge or first third of the orbit. Preopercle with two or three spines along its vertical border, and three more along its lower limb: turbinal spines present: some blunt ones along the upper edge of the orbit: occipital ridge with two blade-like spines: two more, but less developed, on the temporal ridge: lower margin of preorbital with three blunt spines and a raised line, sometimes almost spinate, running across the cheeks from that bone to the upper preopercular spine. Opercular spine but slightly developed. A long tentacle from the upper edge of the orbit and about half the length of the head: also fleshy tentacles along the lower edge of the preorbital, the hind one of which is most developed. *Teeth*—villiform in jaws and vomer. *Fins*—the first ten dorsal spines are high, and equal to the height, or one half more, of the body, the interspinous membrane deeply emarginate: soft portion of fin not so high as the spinous: pectoral reaching to or beyond the root of the caudal, the membrane between the upper four rays deeply cleft: ventrals reach the anal rays: third anal spine the longest, being three-fourths as high as the first dorsal spine: caudal rather rounded or wedge-shaped. *Colours*—reddish, with vertical brown bands having narrower and lighter intermediate ones: three or four broad ones radiate from the eye: one passes over the nape, and seven or eight more are present on the body, the third and fourth usually coalescing under the middle of the pectoral fin. A black mark in the axilla, having a pure white spot in its centre. Dorsal spines annulated with black: soft dorsal, caudal, and anal spotted: pectoral greyish with light-coloured spots: ventral slate-coloured with white spots.

Habitat.—Red Sea, East coast of Africa, through the seas of India to Australia.

5. Pterois cincta, Plate XXXVII, fig. 3.

? Pterois radiata, (Park.) Cuv. and Val. iv, p. 369; Garrett, Fische d. Sudsee, t. lvi, fig. A.

Pterois cincta, Rüpp. N. W. Fische, p. 108, t. 26, f. 3; Günther, Catal. ii, p. 125; Klunz. Verh. z. b. Ges. Wien, 1870, p. 806.

B. vii, D. 11 | $\frac{1}{11}\frac{1}{12}$, P. 16, V. 1/5, A. $\frac{3}{6}$, C. 15, L. l. 25, L. r. 45, L. tr. 7/25.

Length of head 3/11, of caudal 1/4 to 3/14, of pectoral 2/3, height of body 3/11 of the total length. *Eyes*—diameter 2/7 of length of head, 1 diameter from end of snout, and 2/3 of a diameter apart. Interorbital space very concave. The maxilla reaches to below the hind edge of the orbit. Tentacle above the orbit long, and reaching as far as the end of the snout. Margin of orbit serrated: occipital and temporal ridges spinate: other bones about the head comparatively feebly armed. Several fleshy tentacles on the head: long ones on the snout. *Teeth*—villiform in jaws and vomer. *Fins*—eighth to ninth dorsal spines the highest, equalling half the height of the body: pectoral reaches as far as the end of the caudal. *Scales*—on nape. *Colours*—snout uncoloured: a deep brown band edged with white extends from the eye to the angle of the interopercle: the second encircles the neck, and there are six more on the body, which looks as if it were traversed vertically by narrow milk-white bands. A dark band at the base of the pectoral, which is also stained in its outer half; a blackish mark in the axilla without any white spot. Ventral greyish, its spine white: caudal spotted.

The name *P. radiata* attached to a figure of this species in Garrett's Fische d. Sudsee, l. c. would appear* to show that Dr. Günther considers the figure of a *Pterois*, made at Otaheiti by Parkinson, to be identical with the above. See Cuv. and Val. iv, p. 369.

Habitat.—Red Sea, Andamans to the Malay Archipelago and beyond.

Genus, 6—Apistus, *Cuv.*

Pterichthys, Swainson; *Polemius*, Kaup.

Branchiostegals six. Head and body rather compressed. No groove across occiput. Strong and sharp

* Parts i-iii have been published in this country, including lx plates, but only 96 pages of letterpress.

preorbital and preopercular spines: opercles armed. A mandibular barbel. Villiform teeth in jaws, vomer and palate. A single dorsal fin with more spines than rays (D. $\frac{14-15}{7-9}$) *: three anal spines: pectoral elongated and having a free ray at its base. Articulated fin-rays branched. Scales present. Air-vessel with a constriction. A cleft behind the fourth gill.*

Geographical distribution.—From the Red Sea through those of India.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Apistus carinatus*, D. $\frac{14-15}{9}$, P. 12+I, A. $\frac{3}{7}$, L. r. 70. Body greyish above, rosy below: pectoral black and a black blotch on the spinous dorsal: soft dorsal and anal banded in spots. Seas of India to the Malay Archipelago and beyond.

1. Apistus carinatus, Plate XXXVII, fig. 4.

Scorpæna carinata, Bl. Schn. p. 193.
Trigla worrah-minoo, Russell, Fish. Vizag. ii, p. 45, pl. 160, B.
Apistus alatus, Cuv. and Val. iv, p. 392; Tem. Schleg. Fauna Japon, p. 49; Günther, Catal. ii, p. 131.
Apistus carinatus, Cuv. and Val. iv, p. 395.
Apistus Israëlitarum, (Ehrenb.) Cuv. and Val. iv, p. 396; Günther, Catal. ii, p. 131; Klunz. Verh. z. b. Ges. Wien, 1870, p. 809.
Pterichthys alatus et *carinatus*, Swainson, Fish. ii, p. 265.
Polemius alatus, Kaup. Wiegm. Arch. 1858, p. 333.

B. vi, D. $\frac{14-16}{9}$, P. 12+1, V. 1/5, A. $\frac{3}{7}$, C. 12, L. r. 70.

Length of head from 2/7 to 3/11, of caudal 1/4 to 2/9, height of body 3/13 to 1/4 of the total length. *Eyes*—directed slightly upwards and outwards, diameter 2/7 to 1/4 of length of head, rather above 1 diameter from end of snout, and 1/3 of a diameter apart. Upper surface of the head rugose with two divergent lines passing from the snout between the eyes to the occiput where they terminate in small spines a little in front of either side of the base of the dorsal fin. The maxilla reaches to below the centre of the orbit. Preorbital spine as long as the orbit, having two small ones anteriorly on the lower edge of the bone. Preopercle with one strong spine and two or three small ones along its lower edge: opercle rugose, with two spines and a spinate temporal ridge. Barbels—a long slender one, equalling the diameter of the eye, is situated below the mandibular symphysis, and another a short distance behind it. *Teeth*—villiform in jaws, vomer and palate. *Fins*—first dorsal spines increase to the sixth, then decrease to the fourteenth; in some specimens the first few dorsal spines are shorter than in others: membrane deeply notched, fifteenth spine nearly twice as long as the preceding one: pectoral reaching to the base of the last dorsal ray, its single appendage to the first of the anal: ventral slightly longer: third anal spine the longest: caudal cut square. *Scales*—small, somewhat trefoil in shape. *Air-vessel*—thick, constricted in the centre. *Colours*—body greyish along the back, becoming rosy on the abdomen: pectorals deep black: appendage milk-white: dorsal diaphanous, tinged with grey and edged with black, a deep black blotch from the eighth to the fourteenth spine: three oblique brownish streaks on the soft dorsal, which also has a brown edging: upper pectoral ray white: caudal with four vertical black bands: anal greyish, with a yellow horizontal band.

Russell mentions a variety of a grey colour. Ehrenberg's specimen at Berlin has D. $\frac{15}{9}$, not $\frac{15}{7}$ as given by C.V. and Klunzinger.

Habitat.—Seas of India to the Malay Archipelago and beyond, attaining 5 inches in length.

Genus, 7—Centropogon, *Günther*.

Gymnapistes, sp. Swainson.

Branchiostegals six or seven. Head and body rather strongly compressed: no groove on occiput. Preorbital with a strong spine, preopercle likewise spinate: opercle armed. Villiform teeth in the jaws, vomer and palatine bones. A single dorsal fin with more spines than rays (D. $\frac{14-15}{7-9}$) *: anal with three spines: pectoral without any free rays at its base: articulated fin-rays branched. Scales present. (A narrow cleft behind the fourth gill.)*

Geographical distribution.—Seas of India to the Malay Archipelago and beyond.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Centropogon Indicus*, D. $\frac{14}{8}$, A. $\frac{3}{5}$, L. r. 80. Pinkish, with irregular bands on the head: bars on body, anal and caudal fins. Madras.

1. Centropogon Indicus, Plate XXXVIII, fig. 2.

B. vii, D. $\frac{14}{8}$, P. 10, V. 1/4, A. $\frac{3}{5}$, C. 14, L. r. 80.

Length of head 3/10, of caudal 1/5, height of body 1/4 of the total length. *Eyes*—diameter 2/7 of length of head, 3/4 of a diameter from end of snout, and 2/3 of a diameter apart. The maxilla reaches to below the first third of the eye: lower jaw slightly the longer. Interorbital space slightly concave, traversed by two ridges which posteriorly have rather spinate terminations. Preorbital with a strong spine extending to below the last third or hind edge of the eye, and having a small one at its base. A strong preopercular spine equal to

two-thirds of the diameter of the orbit in length, five more blunt ones along its angle and lower edge: opercle with two spines: occipital and temporal ridges sharp but not spinate. *Teeth*—villiform in jaws, vomer and palate. *Fins*—second and third dorsal spines the longest and about equal to two-thirds the height of the body, longer also than the rays: soft portion of the dorsal fin not joined to the caudal: pectoral as long as the head excluding the snout, all the rays branched: ventral reaches the anus: third anal spine considerably the longest and equal in length to the highest in the dorsal fin: caudal slightly rounded. *Scales*—distinct, none on the head. *Colours*—pinkish, with irregular markings over the head, the cheeks being barred with pinkish and brown vertical bands: three or four badly defined vertical bars on the body, the last being over the base of the caudal fin: a vertical brown band over the last third of caudal fin, and the posterior third of the anal banded: ventral nearly black in its last half.

Habitat.—Madras, the specimen figured is $2\frac{1}{2}$ inches long.

Genus, 8—Gymnapistus, *Swains.*

Apistus, sp. Cuv. and Val.: *Trichosomus*,* sp. Swainson: *Prosopodasys*, Günther.

Branchiostegals six. Head and body somewhat compressed: no groove across the occiput. Preorbital and preopercle with strong, sharp spines: opercle armed. Villiform teeth in jaws, vomer and palate. Dorsal fin formed of two portions, the first of three spines which are connected by membrane with the second part, the spines in greater number than the rays: three anal spines, pectoral without any free rays at its base: articulated fin-rays branched. Scales rudimentary or absent.

Geographical distribution.—Seas of India to the Malay Archipelago and beyond.

SYNOPSIS OF SPECIES.

1. *Gymnapistus niger*, D. 3 | $\frac{9-10}{8}$, A. $\frac{3}{7}$. Scales absent. Nearly black. Seas of India to the Malay Archipelago.

2. *Gymnapistus dracæna*, D. 3 | $\frac{9}{5}$, A. $\frac{3}{5-6}$. Scales rudimentary. Greyish-brown, with a black blotch on the dorsal fin between the third and seventh spines: other fins marked with black. Seas of India.

1. Gymnapistus niger, Plate XXXVII, fig. 5.

Apistus niger, Cuv. and Val. iv, p. 415.
Gymnapistes niger, Swainson, Fishes, ii, p. 266.
Prosopodasys niger, Günther, Catal. ii, p. 141.
Pom-tho-cho-rogue-dah, Andam.

B. vi, D. 3 | $\frac{9-10}{8}$, P. 10, V. 1/5, A. $\frac{3}{7}$, C. 9.

Length of head 3/10, of caudal 2/9, height of body 1/3 of the total length. *Eyes*—diameter 1/4 of length of head, 1 diameter from end of snout, and 3/4 of a diameter apart. Mouth oblique, lower jaw very slightly the longer; the maxilla reaches to below the last third of the orbit. Preorbital with a very strong sharp spine reaching to beyond the hind edge of the orbit. Preopercle with a sharp spine, as long as one diameter of the orbit, about the middle of its vertical border, with three obtuse ones below it and two along its horizontal limb, Interorbital space slightly concave. *Teeth*—villiform in jaws, vomer and palate. *Fins*—the first dorsal commences over the hind third of the orbit, the interspinous membrane of the two fins continuous, the second spine is two-thirds as high as the body and there is a short interspace between the two fins: the rayed portion is of equal height with the second part of the spinous, a membraneous prolongation goes from the end of the fin nearly to the base of the caudal. Pectoral, which is 1/4 of the total length, reaches to above the anus, but the ventral does not extend quite so far: third anal spine longer but weaker than the second: caudal cut square. All the articulated fin-rays branched at their extremities. *Scales*—absent except in the form of roughnesses here and there in the skin. *Colours*—brownish-black, caudal yellowish-white, striated with brown and having a dark band in its last fourth and a white external edge.

Habitat.—Seas of India to the Malay Archipelago: very numerous at the Andamans where the specimen (figured life-size) was captured. The natives assert that wounds from its spines are exceedingly venomous.

2. Gymnapistus dracæna, Plate XXXVIII, fig. 1.

Apistus dracæna, Cuv. and Val. iv, p. 403.
Apistus Belengeri, Cuv. and Val. iv, p. 412; Belenger, Voy. Ind. Orient. p. 349.
Trichosomus dracæna, Swainson, Fishes, ii, p. 265.
Prosopodasys dracæna, Günther, Catal. ii, p. 140; Day, Fishes of Malabar, p. 42.
Tetraroge Belengeri, Day, Fish. Malabar, p. 41.

B. vi, D. 3 | $\frac{8-9}{7-8}$, P. 13, V. 1/5, A $\frac{3}{5-6}$, C. 13.

Length of head 2/7, of caudal 1/4, height of body 1/3 of the total length. *Eyes*—diameter 1/4 of length of head, 3/4 of a diameter from end of snout, and 2/3 of a diameter apart. Width of head equals its length behind the orbit. The maxilla reaches to below the first third of the orbit: lower jaw the longer and having a tubercle at the symphysis. Preorbital with a strong sharp spine directed backwards, three-fourths of the orbit

* Preoccupied by *Trichosoma*, Rud. Vermes, 1819, also *(Ramb.) Boisduv.* Lepidop. 1834.

in length and having a small one at its base. Preopercle with a sharp spine as long as the orbit, and three or four blunt points along its angle and lower limb. Opercle with two spines. *Teeth*—villiform in jaws, vomer and palate. *Fins*—dorsal spines sharp but slender; the first arises over the middle of the eye, the interspinous membrane is deeply notched, the second or third spine the longest equalling half the height of the body, all three are longer than the spines of the second dorsal, the membrane of which latter is deeply notched. All the articulated rays are branched. Pectoral a little longer than the head and reaching to above the middle rays of the anal: ventral reaches the anal spines, the third of which is the longest: caudal cut almost square. *Scales*—rudimentary. *Colours*—greyish-brown, a black blotch on the dorsal fin between the third or fourth and seventh or ninth spines: soft dorsal nearly black in its last three-fourths: pectoral blackish, as is also the outer half of the ventral and the anal: caudal yellowish-white with some small brown spots.

Habitat.—Common in the seas in Western India and Ceylon, especially off Canara, where it attains 3 inches in length.

Genus, 9—Amblyapistus, *Bleeker.*

Apistus, sp. Cuv. and Val.: *Platypterus*,* Swainson.

Branchiostegals five or six. Head and body strongly compressed: no groove across occiput. Strong and sharp preorbital and preopercular spines: opercle armed. Villiform teeth in jaws, vomer and palate. A single dorsal fin with more spines than rays (D. $\frac{12-17}{6-10}$) *generally elevated anteriorly: three anal spines: pectoral without any free ray at its base. Articulated fin-rays branched. Scales, if present, rudimentary. Air-vessel present. Pyloric appendages few.*

SYNOPSIS OF SPECIES.

1. *Amblyapistus tænianotus*, D. $\frac{17-16}{8-7}$, A. $\frac{3}{5-7}$. Second dorsal spine as high as the body. Reddish, with irregular dark spots and blotches: a brown mark between the fifth and seventh dorsal spines. Andamans to the Malay Archipelago.
2. *Amblyapistus longispinis*, D. $\frac{13-15}{6-8}$, A. $\frac{3}{4-5}$. Second dorsal spine two-thirds as high as the body. Scales minute. Pinkish, with blotches and a white spot on the side. Seas of India to China.
3. *Amblyapistus macracanthus*, D. $\frac{15-16}{9-10}$, A. $\frac{3}{8}$. Brownish-black: pectoral with a white border. Andamans and Malay Archipelago.

1. Amblyapistus tænianotus, Plate XXXVIII, fig. 5.

Tænianotus latovittatus, Lacep. iv, pl. 3, f. 2 (no description.)

Apistus tænianotus, Cuv. and Val. iv, p. 404; Richardson, Voy. Samarang, Fish. pl. 4, fig. 1 and 2; Bleeker, Amb. ii, p. 557.

Tetraroge tænianotus, Günther, Catal. ii, p. 136.

Platypterus tænianotus, Swains. Fish. ii, p. 265.

Amblyapistus tænianotus, Bleeker, Fish. Maur. p. 87.

B. v. D. $\frac{17-16}{8-7}$, P. 12, V. 1/5, A. $\frac{3}{5-7}$, C. 12.

Length of head 3/13, of pectoral 2/7, of caudal 4/17, height of body 2/7 of the total length. *Eyes*—diameter 3/10 of length of head, nearly 1 diameter from end of snout and 3/4 of a diameter apart. Body strongly compressed, the profile from the snout to the commencement of the dorsal fin almost vertical. The maxilla reaches to below the front edge of the orbit, lower jaw slightly the longer. Preorbital spine curved and very sharp, of moderate length and having a small basal one: preopercle with a sharp spine a little above its angle, and three or four blunt ones along its lower margin: two opercular spines, the upper the longer. *Teeth*—villiform in jaws, on vomer, and in a small patch on the palate. *Fins*—dorsal high anteriorly, its first spine a little above one diameter of the orbit in length, its second as high as the body, and its third a little shorter: from about the fourth spine to the end of the rays all are of about the same height: a slight membraneous continuation between the end of the dorsal and base of the caudal fins. All the articulated fin-rays branched.† The ventrals do not reach the anal and are shorter than the pectoral: third anal spine the longest: caudal slightly rounded. *Scales*—rudimentary. *Lateral-line*—first sixteen tubules distinct, subsequently they coalesce into one tube. *Colours*—reddish, with irregular brownish spots, a brown mark between the fifth and sixth or seventh dorsal spines.

Habitat.—Andaman islands, Malay Archipelago and beyond, attaining a few inches in length. The specimen figured is in the British Museum collection.

2. Amblyapistus longispinis, Plate XXXVIII, fig. 4.

Apistus longispinis, Cuv. and Val. iv, p. 408; Quoy and Gaim. Voy. Astrol. Poiss. p. 694, pl. xi, fig 4.

Apistes multicolor, Richardson, Voy. Samarang, Fishes, p. 3, pl. iv, fig. 3, 4.

Tetraroge longispinis, Günther, Catal. ii, p. 134.

B. vi, D. $\frac{13-15}{6-8}$, V. 1/4 A. $\frac{3}{4-5}$, C. 12.

* Preoccupied (K. and V. Hass.) Cuv. and Val. Fishes, 1837, &c.

† The specimen marked "*b.* Young, Madras. Presented by T. C. Jerdon, Esq," has *none* of its articulated rays branched, it is *A. roseus*.

Length of head 4/15, of caudal 2/11, height of body 3/11 of the total length. *Eyes*—diameter 2/7 of length of head, one diameter from end of snout, and nearly one apart. Body strongly compressed, a rise from the snout to the base of the dorsal fin at about 45°. The maxilla reaches to below the middle of the orbit, lower jaw slightly the longer. Preorbital with one sharp spine reaching to below the hind edge of the orbit and having a small one at its base. A strong sharp spine at the angle of the preopercle, and some blunt ones along its lower edge: opercular spines moderately developed. *Teeth*—villiform in jaws, vomer, and palate. *Fins*—dorsal spines moderately strong, commencing over the middle of the eye, interspinous membrane deeply emarginate, the first dorsal spine equals the length of the head in front of the middle of the eye, the second and third are of equal length and as long as the head excluding the snout, last eight spines of about the same height as the rays: pectoral as long as the head, its articulated rays branched, and it extends as far as the ventral: second anal spine rather strong and nearly as long as the head anterior to the hind edge of the eye, third spine equals the length of the head behind the middle of the eye: caudal cut square. *Scales*—rudimentary, but distinct. *Lateral-line*—with 20 tubes. *Colours*—pinkish, a brown spot on the lateral line below the seventh dorsal spine, and a white one above and behind it: fins with brown spots, end of caudal blackish.

The specimen is figured life-size from one from China in the British Museum, presented by Mr. Reeves. I never obtained this species in India, but one stated to have come from thence was given the British Museum by General Hardwicke.

Habitat.—Seas of India to China, attaining a few inches in length.

3. Amblyapistus macracanthus, Plate XXXVIII, fig 3.

Apistus macracanthus, Bleeker, Ceram. p. 267.
Tetraroge macracanthus, Günther, Catal. ii, p. 133.

B. vi, D. $\frac{15-16}{9-10}$, P. 12, V. 1/5, A. $\frac{3}{5}$, C. 12.

Length of head 2/9, of caudal 1/4, height of body 2/7 of the total length. *Eyes*—diameter 3/11 of length of head, 1 diameter from end of snout, and 3/4 of a diameter apart. Body strongly compressed. The maxilla reaches to below the first third of the orbit. Preorbital with two strong sharp spines: five along the angle and vertical limb of the preopercle, the upper being sharp and the strongest: opercle with two spines. Barbels absent. *Teeth*—villiform in jaws, vomer, and palate. *Fins*—dorsal fin commences before the eyes, is high anteriorly, the first three spines being at some distance from the others, the second dorsal spine the highest, being nearly as high as the body, the last spine as high as the rays. All the articulated fin-rays branched near their extremities. Pectoral rather longer than the height of the body: ventral reaches the anal: third anal spine the longest and equal to half the length of the head: caudal pointed, its lower border truncated, it is slightly joined to the base of the caudal by a membranous prolongation. *Scales*—a few small ones imbedded in the skin on the body. *Colours*—brownish-black, the pectoral with a white border.

Habitat.—Andamans and Malay Archipelago, the specimen figured (a female 3½ inches long) was captured at the Andaman islands.

Genus, 10—Micropus, *Gray*.

Caracanthus, Kröyer: *Amphiprionichthys*, Bleeker: *Centropus*, Kner: *Crossoderma*, Guichenot.

Branchiostegals four to six. Body strongly compressed. Preorbital, pre- sub- and inter-opercles armed. Villiform teeth in the jaws only. A single or two dorsal fins, the first with seven or eight spines, the anal with two: no free pectoral rays: ventrals rudimentary: some of the articulated fin-rays branched. Body scaleless, but covered with small tubercles, (no cleft behind the fourth gill.)

Geographical distribution.—These small fishes appear to be distributed through the seas of India to the Malay Archipelago and beyond.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Micropus Zeylonicus*—D. 7/14, A. $\frac{2}{11}$, yellowish-brown, with darker reticulations. Malabar and Ceylon.

1. Micropus Zeylonicus, Plate XXXVIII, fig. 6.

Amphiprionichthys Zeylonicus, Day, Proc. Zool. Soc. 1869, p. 515.

B. iv, D. 7/14, P. 13, V. 1/3?, A. $\frac{2}{11}$, C. 15.

Length of head nearly 1/3, of caudal 1/5, height of body 4/9 to 1/2 of the total length. *Eyes*—high up, 1½ diameters from end of snout and 1 apart. Body elevated and compressed, the profile from the dorsal fin to the snout very steep. Mouth anterior, lower jaw rather the longer: the maxilla reaches to below the middle of the eye. Preorbital with a strong spine directed backwards and somewhat downwards: preopercle with five blunt spines, the two lowest being the longest: an equally long one but not so blunt exists on the interopercle: subopercle with one blunt spine: opercle with two badly developed spines. A serrated ridge passes from the back of the orbit towards the occiput. *Teeth*—villiform in the jaws, none on the vomer or palate. *Fins*—dorsal fin has a notch between its two portions, the third and fourth spines the highest, and equal to a little more than 1 diameter of the orbit: rays not so high as the spines: ventrals rudimentary: anal spines with a deep notch in the membrane separating them from the rays. *Scales*—absent, but slight elevations on the skin. *Colours*—bluish along the upper half of the body, becoming dirty brown on the abdomen: several irregular

rows of yellowish blotches along the back and sides, separated by a darker reticulation: fins light-coloured, caudal marked as the sides of the body.

Habitat.—The specimen figured ($1\frac{1}{2}$ inches long) is from Malabar; some from Ceylon, dredged by Dr. Anderson in the Galle harbour, exist in the Calcutta Museum, the largest is $2\frac{1}{2}$ inches in length.

Genus, 11—Minous, *Cuv. and Val.*

Corythobatus, sp. Cantor.

Branchiostegals seven. Head large, body rather compressed: a groove across occiput. Preorbital with a strong spine, preopercle likewise spinate: opercle armed. Villiform teeth on jaws and vomer, palatines edentulous. A single dorsal fin with about the same number of spines as rays (D. $\frac{9-11}{12-9}$)*: anal spines if present badly developed: pectoral with a free ray at its base. Articulated fin-rays single, unbranched. Scales absent. Cæcal appendages few. (A cleft behind the fourth gill.)*

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Minous monodactylus*, D. $\frac{9-11}{12-9}$, P. 10+I, A. 9-11. Greyish, becoming flesh-coloured along the abdomen, fins marked with black. Seas of India to the Malay Archipelago and beyond.

1. Minous monodactylus, Plate XXXVIII, fig. 7.

Scorpæna monodactyla, Bl. Schn. p. 195.
Trigla worrah-minoo, Russell, ii, p. 44; fig. 149.
Apistus minous, Cuv. Rég. Anim.
Minous woora, Cuv. and Val. iv, p. 421; Richards. Ich. China, p. 213; Bleeker, Sumatra, ii, p. 251.
Minous monodactylus, Cuv. and Val. iv, p. 424, pl. 59, f. 2; Bleeker, Sclerop. p. 9, and Fish. Mauritius, p. 87; Günther, Catal. ii, p. 148; Day, Fish. Malab. p. 43.
Apistes Russellii et *monodactylus*, Swains. Fish. ii, p. 265.
Corythobatus woora, Cantor, Catal. p. 45.
Minous Adamsii, Richards. Voy. Samar. Fish. p. 7, pl. 2, f. 4, 5.
Cul-plauchee, Tam.

B. vii, D. $\frac{9-11}{12-9}$, P. 10+I, V. 1/5, A. 9-11, C. 10, Cæc. pyl. 4.

Length of head 3/10, of caudal 1/4, height of body 4/17 to 1/4 of the total length. *Eyes*—diameter 2/7 to 1/4 of the length of head, $1\frac{1}{2}$ diameters from the end of snout, and also apart. The maxilla reaches to below the front edge of the orbit. Preorbital spine strong, sharp, and equal in length to 2/3 of the diameter of the orbit, and having another small one at its base. In one specimen there are two long preorbital spines on one side as well as the basal one, but the normal number on the other. Preopercle with a strong sharp spine at its angle and three other shorter and blunter ones, one or two short ones also at its lower limb. Temporal and occipital ridges spinate, and all or most of those on the head rugose, as are also the edge of the orbit and the superciliary ridge. *Teeth*—fine in jaws, on vomer, but none on the palate. *Fins*—dorsal spines moderately strong, the first distinct from the remainder, the membrane deeply cleft: pectoral large and as long as the head, reaching to below the commencement of the soft dorsal or even to its third ray, a single free ray below the pectoral fin which is nearly as long as the fin, in dried specimens it sometimes splits into two: caudal rays, and all the articulated ones, unbranched. *Scales*—absent. *Colours*—head greyish-brown above, sides and abdomen lighter or flesh-coloured, with dark blotches and marks: dorsal fin light brown margined with black: pectoral black, its appendage white: caudal buff, with three vertical brown bars.

Habitat.—Seas of India to China, attaining 4 or 5 inches in length.

Genus, 12—Cocotropus, *Kaup.*

Corythobatus, sp. Cantor; *Tetraroge*, pt. Günther.

Branchiostegals six. Head and body strongly compressed: no groove across the occiput. Preorbital with a strong blunt spine: preopercle with a similar one: opercle armed. Villiform teeth in jaws and vomer, palatines edentulous. A single dorsal fin with more spines than rays (D. $\frac{13-15}{8-10}$)*: two weak anal spines: pectoral without any free ray at its base. Articulated fin-rays single, unbranched. Scales absent.*

SYNOPSIS OF SPECIES.

1. *Cocotropus echinatus*, D. $\frac{13}{11}$, P. 11, A. $\frac{2}{7-8}$. Pinkish. Seas of India to the Malay Archipelago.
2. *Cocotropus roseus*, D. $\frac{14-15}{9-10}$, P. 14, A. $\frac{2}{7-8}$. Pinkish, a white outer angle to each side of the caudal fin. Coromandel coast of India.

1. Cocotropus echinatus.

Corythobatus echinatus, Cantor, Catal. p. 45, pl. 13.
Cocotropus echinatus, Kaup. Wiegn. Arch. Naturg. 1858, p. 333.
Tetraroge echinata, Günther, Catal. ii, p. 136.

B. vi, D. $\frac{13}{11}$, P. 11, V. 1/3, A. $\frac{2}{8}$, C. 12.

Length of head 3/11, of pectoral 1/4, of caudal 1/6, height of body 2/7 of the total length. *Eyes*—

near the dorsal profile and below the base of the two first dorsal spines, diameter 2/9 of length of head, $1\frac{1}{3}$ diameters from end of snout, and 3/4 of a diameter apart. Body and head strongly compressed, the anterior profile ascends almost vertically from the snout to the base of the first dorsal spine. Maxilla reaches to below the centre of the orbit. Preorbital with a strong curved blunt spine, having a smaller but similar one at its base: four blunt spines along the margin of the preopercle and three on the opercle. *Teeth*—villiform in the jaws, and in a crescentic band on the vomer. *Fins*—the single dorsal commences over the front half of the orbit, the first spine being rather curved, and the longest equalling the head excluding the snout, the last spines as high as the rays which are unbranched: from the end of the dorsal fin a membraneous continuation extends to the base of the caudal. Anal spines very weak: caudal rounded. Body and head studded with small obtuse prickles. *Lateral-line*—indistinct. *Colours*—buff, with five brown lines radiating from the eye; upper edge of dorsal purple: some large brownish blotches in the upper half of the body, all the fins more or less dotted with brown, and a whitish spot at the upper and lower angle of the end of the caudal.

This species exists in the Calcutta Museum, where it was labelled *Apistes spinosa*, from the Andamans, it attains a few inches in length.

Habitat.—Andamans and Pinang.

2. Cocotropus roseus, Plate XXXVIII, fig. 8.

B. vi, D. $\frac{14-15}{9-10}$, P. 14, V. 1/3, A. $\frac{2}{7-8}$, C. 12.

Length of head 2/7, of caudal 1/7, height of body 2/7 of the total length. *Eyes*—placed high up, diameter 1/4 of length of head, $1\frac{3}{4}$ diameters from end of snout, and 3/4 of a diameter apart. Body strongly compressed: profile from dorsal fin to snout oblique: mouth slightly oblique, lower jaw a little the longer. Preorbital with two blunt spines, the longest going backwards to beneath the first third of the eye, the lower and shorter one a little downwards and backwards. A rough ridge passes across the suborbitals to a little above the angle of the preopercle on the vertical limb of which are two blunt spines, the upper the longer, and equal to the diameter of the orbit in length: two more smaller spines along its horizontal limb: three opercular spines: an elevated occipital ridge, and also a temporal one having three blunt spines. No barbels. *Teeth*—villiform in jaws and vomer, none on the palate. *Fins*—dorsal fin continuous, it commences over the middle of the eye; spines strong, the second being slightly the longest and equal to half the height of the body, they subsequently slightly decrease to the last which is as high as the first ray: a membraneous extension exists from the end of the dorsal fin, and nearly reaches the base of the caudal. All the articulated fin-rays are unbranched. Pectoral equals the length of the head and reaches to the commencement of the anal: ventral short, reaching half way to the anus, it has one spine and three rays: two weak anal spines only: caudal rounded. *Scales*—absent, skin with many widely spread rough elevations, becoming somewhat spinate in large specimens: tubes of lateral-line 10 or 11 distinct ones in number, which occupy its whole length. *Colours*—fleshy, the fins having more of a pinkish tinge. Dorsal fin edged with white, having a dull grey band along its centre, and most distinct in its last half: caudal edged with white, and having a dull base due to numerous grey spots: pectoral and anal reddish, the former having many black spots upon it: ventrals white.

These fish are very common in Madras in October, and through the cold months, but they rarely exceed $2\frac{1}{2}$ or 3 inches in length.

Jerdon observes (Madr. Journ. Lit. and Sc. 1851, p. 141), "*Agriopus* ———, I possess a drawing of a small species of this genus of a mottled red colour throughout. I only procured it once, it was named *Crasi toumbi*, Tam." The specimen is in the British Museum, as *Tetraroge tænianotus* (ii, p. 136), from which it may be readily distinguished, as the spines on its head are blunt, and its articulated fin-rays are unbranched, which is not the case in *A. tænianotus* (see p. 157).

My reasons for considering this distinct from *C. echinatus* are the more oblique profile from the snout to the dorsal fin: the second dorsal spine (instead of the first) being the highest: the pectoral having 14 (instead of 10) rays, &c.

Habitat.—Coromandel coast of India. The specimen is figured life-size.

Genus, 13—Pelor, *Cuv. and Val.*

Branchiostegals seven. Head irregularly shaped. Villiform teeth in the jaws and vomer. The three first dorsal spines connected by a membrane and are at a little distance from the others (12-14) *which are somewhat isolated one from another, due to the interspinous membrane being deeply cleft: two free rays at the base of the pectoral fin, having a connecting membrane: ventrals thoracic. Articulated fin-rays branched. Scales absent. Head, body and fins with skinny appendages. Air-vessel small. Pyloric appendages few.*

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Pelor didactylum*, D. 3 | $\frac{13-14}{8-9}$, A. 11-12. Brownish-grey, irregularly banded. Andaman islands to the Malay Archipelago and beyond.

1. Pelor didactylum, Plate XXXIX, fig. 1.

Scorpæna didactyla, Pallas, Spic. Zool. Fas. vii, p. 26, t. 4.
Trigla rubicunda, Hornst. Nga Handl. ix, p. 45, t. 3.

Synanceia didactyla et *rubicunda*, Bl. Schn. pp. 195, 196.

Pelor maculatum, Cuv. and Val. iv, p. 434; Less. Voy. Coq. Poiss. p. 210, t. xx; Günther, Catal. ii, p. 150.

Pelor obscurum, Cuv. and Val. iv, p. 436; Less. Voy. Coq. Zool. ii, p. 211, Poiss. pl. 21, f. 2; Bleeker, Ceram. iii, p. 241; Kner, Novara Fische, p. 119.

Scorpæna digitata, Gronov. ed. Gray, p. 117.

Pelor didactylum, Günther, Catal. ii, p. 150; Bleeker, Révis. Synan. 1874, p. 7, t. iv, f. 1.

B. vii, D. 3 | $\frac{13-15}{8-9}$, P. 10 + II, V. 1/5, A. 11-12, C. 12.

Length of head 2/7 to 1/4, of caudal 2/11, height of body 2/7 of the total length. *Eyes*—diameter 2/11 in the adult to 1/3 in the young of length of head, $2\frac{1}{2}$ diameters from end of snout, and from 1 to $1\frac{1}{4}$ apart. The maxilla reaches to nearly below the front edge of the eye: lower jaw considerably the longer: the width of the head at the opercles equals its length. Interorbital space deeply concave with a transverse ridge between the two eyes: a deep saddle-shaped depression across the occiput: a groove below the eyes. Upper edge of orbit with blunt spines: spinate occipital and temporal ridges: preopercle with spines on its vertical border: a suborbital spinate ridge: a turbinal spine: opercle mostly with two spines. Rather long fleshy tentacles on the lower jaw. *Teeth*—villiform in jaws and on vomer, none on the palate. *Fins*—second dorsal spine somewhat the longest of the three first, as high as the longest in the rest of the fin, and 3/5 of the length of the head: interspinous membrane deeply cleft and covered with skinny appendages. Pectoral equals the length of the head, and has two free rays at its base: caudal cut almost square. *Scales*—absent, but skinny appendages over the head, back, and fins. *Colours*—brownish-grey becoming dirty white beneath, with fine spots over the body and head. Dorsal coloured as the body, a dark band passes down the last few spines on to the body, and another over the last few rays takes the same course: caudal yellow with a dark vertical band across its base, and another in its last third: outer edge of anal dark coloured.

Habitat.—Andaman islands, from whence the one figured (a female $5\frac{1}{2}$ inches in length) was procured, to the Malay Archipelago, and beyond.

Genus, 14—Choridactylus, *Richardson*.

Branchiostegals six. Head and body compressed. Bones of the head with osseous ridges; the preorbital, preopercle and opercle with spines: a groove on the occiput. Villiform teeth on the jaws, palate edentulous. A single dorsal fin with more spines (13) *than rays* (9): *anal with two spines: pectoral fin with three free rays: ventrals with one spine and five rays. Articulated fin-rays branched. Scales absent: some skinny appendages on the body. Air-vessel absent. Pyloric appendages few.*

Geographical distribution.—Coromandel coast of India, and seas of China.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Choridactylus multibarbis*, D. $\frac{13}{9}$, P. 9 + III, A. $\frac{2}{8}$. Brownish with darker markings: dorsal fin yellow with black marks: caudal yellow, with black basal and terminal bands: other fins dark, the ventral with white spots. Madras and China.

1. **Choridactylus multibarbis**, Plate XXXIX, fig. 2.

Choridactylus multibarbis, Richardson, Voy. Samarang, Fishes, p. 8, pl. 2, f. 1-3.

Chorismodactylus multibarbis, Günther, Catal. ii, p. 151.

B. vi, D. $\frac{13}{9}$, P. 9+III, V. 1/5, A. $\frac{2}{8}$, C. 15.

Length of head 1/4, of pectoral 1/4, of caudal 1/5, height of body 2/7 of the total length. *Eyes*—high up, with prominent orbits, diameter 2/7 of length of head, 1 diameter from end of snout, and rather more apart. Mouth anterior: lower jaw slightly the longer, the maxilla reaches to beneath the front edge of the orbit. Interorbital space concave, with two longitudinal ridges which posteriorly end in a transverse one connecting them together, Upper edge of orbit with points scarcely spinate. Preorbital with a sharp spine posteriorly, two-thirds the length of the orbit having a small one at its base pointing downwards, as well as two or three more spinate elevations. A spinate or rough ridge runs along the suborbitals and over the cheeks to the middle of the vertical limb of the preopercle, which is armed with a sharp spine that crosses the whole width of the opercle: it has a small one directed outwards at its base: there is likewise a spine at the angle of the preopercle, and three blunt points along its horizontal edge. Two spines on the opercle. Occipital and temporal ridges with blunt spines, one on the shoulder girdle above the base of the pectoral fin. A deep depression across the occiput, extending down behind the eyes. A fleshy tentacle over the centre of the eye, and some on the mandible. *Teeth*—villiform in the jaws. *Fins*—dorsal fin commencing just behind the eyes, the first three spines somewhat removed from the rest, the fourth likewise stands at some distance from those in front of or behind it, the third and fourth spines the longest, nearly equalling two-thirds the height of the body, interspinous membrane deeply emarginate: rays a little higher than the longest spine and branched near their extremities: pectoral rounded and having three free rays below its base: ventral large and attached by nearly the whole length of its inner edge by a skinny flap to the abdomen: anal spines small, the second one-third the longest: caudal rounded. *Scales*—absent. *Colours*—brownish, with a yellow shoulder mark, and two or three vertical orange bands: base of ventral and anal with fine white spots. Fins blackish brown, with

a light band between the fourth and sixth dorsal spines: margins of pectorals orange: caudal with a black band at its base, and another in its last third having a light edge: outer two-thirds of anal blackish: free rays black, with white in their middle.

This is the species observed upon by Jerdon (Madr. J. L. and Sc. 1851, p. 141,) as follows:—"I have drawings and specimens of a very curious fish, which I have marked as *Apistus niger*, C. V. I however hardly think it can belong to this genus; it appears to me rather an aberrant form of *Pterois*, allied to Swainson's genus *Brachyrus*."

This fish is very common at Madras, attaining about 4 inches in length: the specimen figured (life-size) is from that locality.

Habitat.—Coromandel coast of India, and China.

Genus, 15—Synancidium, *Müll.*

Bufichthys, Swains.

Branchiostegals seven. Head monstrous and irregularly shaped, but without sharp spines. Villiform teeth on the jaws and vomer, but not on the palatines. The soft dorsal continuous with the spinous, less rays (6-9) *than spines* (13); *anal with* 3 *spines and few* (5) *rays: no pectoral appendages. Scales absent: body and sometimes the head with skinny flaps. Air-vessel small. Pyloric appendages few.*

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Synancidium horridum*, D. $\frac{12-13}{6-7}$, A. $\frac{3}{5}$. Eyes elevated: a deep saddle-shaped depression across the occiput.

1. Synancidium horridum, Plate XXXIX, fig. 3.

Scorpæna horrida, Linn. i, p. 453; Bl. t. 183; Lacép. iii, p. 261, ii, t. 17, f. 2.

Synanceia horrida, Bl. Schn. p. 194; Cuv. and Val. iv, p. 440; Bleeker, Verh. Bat. Gen. xxii, Scler. p. 9, and Révis. Synan. 1874, p. 12.

Scorpæna monstrosa, Gronov. ed. Gray, p. 117.

Synanceia grossa, Gray and Hard. Ind. Zool. i, pl. 97.

Bufichthys horrida et *grossa*, Swainson, Fish. ii, p. 268.

Synanceia trachynis, Richards. Ann. and Mag. Nat. Hist. 1842, ix, p. 385.

Synancidium horridum, Müll. Akad. Wiss. 1844, p. 163; Günther, Catal. ii, p. 144; Kner. Novara Fische, p. 119.

B. vii, D. $\frac{12-13}{6-7}$, P. 16, V. 1/5, A. $\frac{3}{5}$, C. 12, Cæc. pyl. 3, Vert. 10/14.

Length of head 1/3, of caudal 2/11 to 1/6, height of body 1/3 of the total length. *Eyes*—diameter 1/8 of length of head, 3 diameters from end of snout. Crown of head irregularly saddle-shaped: a deep groove on the cheeks, orbit raised. *Teeth*—villiform in the jaws and on the vomer, which last, Bleeker observes, are not invariably present.* *Fins*—dorsal spines stiff, the three first the highest and somewhat separated from the others: the vertical fin more or less enclosed in skin. Articulated fin-rays branched. Skin with numerous large and small tubercles even when on the fins: some large fringed tubercles along the lower edge of preopercle and preorbital. *Colours*—brownish-fawn colour superiorly, becoming lighter below: irregular blotches on the body, and smaller ones on the fins.

Habitat.—Seas of India to the Malay Archipelago and beyond.

Genus, 16—Synanceia, *Bl. Schn.*

Synanceichthys, Bleeker.

Branchiostegals seven. Head monstrous, irregularly shaped but spineless, no saddle-shaped fossa across the occiput: no transverse elevation between the orbits, nor deep groove below the eyes. Villiform teeth on the jaws, vomer and palatine bones edentulous. The soft dorsal continuous with the spinous, less rays (5-6) *than spines* (13-16): *anal with* 3 *spines and few* (5) *rays, no pectoral appendages. Air-vessel present. Scales absent. Pyloric appendages few.*

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Synanceia verrucosa*. D. $\frac{1\,3}{6\,5}$, A. $\frac{3}{5}$. From the Red Sea, through those of India to the Malay Archipelago and beyond.

1. Synanceia verrucosa, Plate XXXIX, fig. 4.

Bl. Schn. p. 195, t. 45; Rüpp. N. W. Fische, p. 109; Günther, Catal. ii, p. 146; Klunz. Verh. z. b. Ges. Wien, 1870, p. 811; Bleeker, Révis. Syn. 1874, p. 15.

Scorpæna brachio, Lacép. iii, pp. 259, 272, pl. 12, f. 1.

Scorpæna brachiata, Shaw, Zool. iv, pt. 2, p. 274.

Synanceia sanguinolenta, Ehren. Pisc. t. 3.

Synanceia brachio, Cuv. and Val. iv, p. 447; Bleeker, Sclerop. p. 9.

* Of course if the presence of vomerine teeth is inconstant, the genus *Synancidium* (which is chiefly separated from *Synanceia* owing to their presence) has no generic value.

B. vii, D. $\frac{13}{6-8}$, P. 1/8, V. 6, A. $\frac{3}{5}$, C. 10-12, Cæc. pyl. 0(4). Vert. 10/14.

Length of head 2/5, of caudal 1/7, height of body $2\frac{2}{3}$ in the total length. *Eyes*—diameter 1/6 to 1/7 of length of head and 2 diameters from end of snout. Head monstrous: interorbital space very concave: orbits but little elevated. A slight groove on the cheek: no saddle-shaped depression across the occiput. The anterior extremity of the lower jaw is on the dorsal profile. Body with cutaneous excrescences, and many filaments about the head. *Colours*—brownish, caudal with a vertical dark band down its centre and white margins: pectoral and ventral with dark edges and light borders: anal banded.

Lienard's *Synancée à trois bandes*, D. 13/7, P. 18, V. 1/5, A. $\frac{3}{6}$, C. 14 (Nat. Hist. Soc. Mauritius, 1839, p. 34) is apparently this species. Three vertical white bands, the first between the fifth and seventh dorsal spines: the second at the commencement of the rays: the third over the base of the caudal. Caudal with two brown bands between the white, and a third of yellow.

Le Juge, in the Transactions of the same Society (1871, v, p. 19), has observed that this fish termed 'Laffe' is very poisonous at the Mauritius; the poisonous instrument being its dorsal spines, each of which has a poison bag at its base.

Habitat—Red Sea, East coast of Africa, seas of India to the Malay Archipelago and beyond: attaining at least 13 inches in length.

Genus, 17—Pseudosynanceia.

Branchiostegals seven. Body elongated, anteriorly sub-cylindrical, posteriorly compressed: head broad depressed. Eyes on the upper surface of the head directed upwards. Preopercle and preorbital armed. Gill-opening with a superior as well as posterior orifice, the two being continuous. Villiform teeth in the jaws and on the vomer, none on the palate or tongue. A single dorsal fin with strong spines (16) *and* (5) *unbranched rays: anal with three spines and few rays* (7). *No pectoral appendage. Ventral thoracic with one spine and less than five* (3) *rays, and not united to the abdomen along its inner edge. Articulated fin-rays unbranched. Scales absent, skin smooth.*

This genus differs from *Leptosynanceia*, Bleeker, in having vomerine teeth. Should these teeth be inconstant, the fish described would belong to genus *Leptosynanceia.*

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Pseudosynanceia melanostigma.* D. $\frac{16}{5}$, A. $\frac{3}{7}$. Grey mottled with black. Some of the fins yellow with black edges or bands. Coast of Sind.

1. Pseudosynanceia melanostigma, Plate LV, fig. 6.

B. vii, D. $\frac{16}{5}$, P. 14, V. 1/3, A. $\frac{3}{7}$, C. 11.

Length of head $4\frac{1}{3}$, of caudal $4\frac{1}{3}$, height of body one-sixth in the total length. *Eyes*—diameter 1/7 of length of head, $1\frac{1}{2}$ diameters from end of snout, and 3 apart. The eyes are upon the upper surface of the head and directed upwards and slightly outwards. The maxilla, which expands posteriorly, reaches to below the middle of the eye. Upper surface of head depressed and its width rather exceeding its length. Preorbital with ridges placed in a star form and ending in two spines on its lower border. Upper surface of the head with sinuous, but not spinate, ridges. Preopercle with a moderately strong spine at its angle, and three short blunt ones along its lower limb. Opercle with a spine. Gill opening with a small rounded superior orifice, exclusive of, but continuous with the posterior one. Lower jaw the longer, its symphysis forming a portion of the dorsal profile. *Teeth*—villiform in the jaws, in a well-developed transverse band across the vomer, none on the palate or tongue. *Fins*—dorsal spines strong, commencing over the centre of the opercle, the posterior ones being somewhat the longest but not so high as the rays, which are unbranched; interspinous membrane deeply cleft, the soft dorsal not continuous with the caudal. Pectoral with its upper rays much the longest, it extends to over the anal. Ventral short. Anal spines short but pungent, its rays and those of the caudal unbranched. No skinny tentacles on head, body or fins. *Colours*—of a grey mottled with black on the top of the head and along the back, becoming yellow on the abdomen. Spinous dorsal also mottled, a vertical yellow band across the front half of the soft dorsal, and black in its last half. Pectoral yellow, with some grey spots at its base and a wide black edge. Ventral and anal yellow edged with black. Caudal yellow, with a black band down its last half, externally edged with yellow.

Habitat.—Kurrachee, in Sind, where I procured the specimen figured (7 inches long). It lives in the mud and is difficult to obtain, for although I saw several we only captured one.

Genus, 18—Polycaulis, *Günther.*

Synanceia, sp. Bloch: *Trachicephalus*,* Swainson.

Branchiostegals seven. Body anteriorly sub-cylindrical, posteriorly compressed: head broad, rather depressed. Eyes directed upwards. Preopercle armed. Gill-opening with a superior as well as posterior orifice, the two being continuous. Villiform teeth in the jaws, absent on the vomer. A single dorsal fin with flexible spines and rays: anal somewhat elongated: no pectoral appendages: ventral thoracic, united to the abdomen along its inner edge. Articulated fin-rays unbranched. Scales absent. Vertical fins more or less enveloped in skin.

Geographical distribution.—Seas of India to the Malay Archipelago and beyond.

* Preoccupied, *Trachycephalus*, Tsch. Rept. 1838.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Polycaulis elongatus*, D. $\frac{9-12}{11-14}$, A. 11-15. Brown, with the fins black-edged or else spotted with white. Seas of India to the Malay Archipelago and beyond.

1. Polycaulis uranoscopus, Plate XXXIX, fig. 6.

Synanceia uranoscopa, Bl. Schn. p. 195; Cuv. and Val. iv, p. 458.

Synanceia elongata, Cuv. and Val. iv, p. 456; Bleeker, Verh. Bat. Gen. xxii, Sclerop. p. 10; Griffith, Cuv. An. King. xi, pl. 8, fig. 3.

Trachicephalus elongatus, Swainson, Fishes, ii, p. 268.

Synanceia breviceps, Richardson, Voy. Sulph. Fishes, p. 71.

Uranoscopus adhesipinnis, Blyth, J. A. S. of B. 1860, p. 142.

Polycaulus elongatus, Günther, Catal. ii, p. 175; Kner, Novara Fische, p. 120.

B. vii, D. $\frac{9-12}{11-14}$, P. 13, V. 1/5, A. 11-15, C. 11.

Length of head from 1/5 to 2/9, of caudal 1/5 to 2/11, height of body 1/5 to 2/9 of the total length. *Eyes*—diameter 2/9 to 1/5 of length of head, $1\frac{1}{2}$ diameters from end of snout, and 2 apart. The maxilla reaches to below the middle of the eyes. Head as wide as long, and covered with bony ridges having numerous blunt points: a blunt preorbital spine having a short one at its base, five along the edge of the preopercle, two on opercle. Lower jaw the longer. Gill-openings having a small rounded superior orifice continuous with the posterior one. *Teeth*—villiform in the jaws, becoming very obsolete in old specimens. *Fins*—spines and rays enclosed in the skin, the dorsal commences between or rather in advance of the superior openings of the gills, its spines are low and more or less flexible. Pectoral pointed and a little longer than the head, ventral attached along its entire inner edge to the abdomen: caudal cut square. *Scales*—absent. *Colours*—brownish, with or without white dots: fins stained dark at their edges, sometimes spotted, the caudal with a white edge.

One of Bloch Schneider's specimens of *Synanceia uranoscopa*, in spirit, was shown me at Berlin as his type, it was identical with that described above. In the description he states it possesses D. 31 (probably a misprint for D. 21), and A. 20 (perhaps for 10, the first short ray having been overlooked). His specimen came from Tranquebar.

Jerdon (M. J. L. & Sc. 1851, p. 141) observes that this fish is termed *Cul toumbi*, Tam. at Madras, and is not very uncommon.

Habitat.—Seas and estuaries of India, to the Malay Archipelago and beyond, attaining at least 5 inches in length.

FAMILY, VIII—TEUTHIDIDÆ, *Cuv.*

Teuthyes, pt. Cuv.

Branchiostegals five: pseudobranchiæ well developed. Body oval and strongly compressed. Eyes of moderate size, lateral. Mouth slightly cleft, and but little protractile. A single row of cutting incisors in either jaw: palate edentulous. One dorsal fin with the spinous portion more developed than the soft: anal with seven spines. Ventrals thoracic, with two spines and three intermediate soft rays. Scales minute. A complete lateral line, but no armature, on the side of the free portion of the tail. Air-vessel present. Pyloric appendages few.

Several different opinions have been advanced respecting the position this family of Acanthopterygian fishes should hold. Cuv. and Val. placed them after their *Mænidæ* and next to their *Acanthuridæ*. Swainson observed (Fishes, ii, p. 247): "the procumbent advanced spine before the dorsal induces me to place this genus between *Seriola* and *Caranx* rather than with the *Acanthuri*."

SYNOPSIS OF INDIVIDUAL GENUS.

1. *Teuthis.*—Definition as in the family.

Genus, 1—TEUTHIS,* *Linn.*

Siganus, Forsk.: *Centrogaster*, Houtt.: *Amphacanthus*, Bl. Schn.: *Buro*, (Comm.) Lacép.

Branchiostegals five: pseudobranchiæ. Body oval, strongly compresssd. Teeth small, denticulated. A single dorsal fin with thirteen spines as well as a horizontal one anteriorly; anal with seven; each ventral with two, an outer and an inner one, having three intermediate rays. Scales minute, cycloid. Air-vessel large, forked both anteriorly and posteriorly. Pyloric appendages when present† *few* (4-6).

Geographical distribution.—Red Sea, East coast of Africa, Seas of India to the Malay Archipelago and beyond.

SYNOPSIS OF SPECIES.

1. *Teuthis Java.* Neutral tint, with grey rounded spots on head, and along the back, becoming more elongated on the sides and lineated on the abdomen. Seas of India, to the Malay Archipelago and beyond.
2. *Teuthis vermiculata.* Light brown, with undulating bluish lines, about one-fourth as wide as the ground colour. Seas of India, to the Malay Archipelago and beyond.
3. *Teuthis marmorata.* More elongated than the last, colours much the same, but the blue lines are narrower and become sinuously-longitudinal on the sides. Seas of India, to the Malay Archipelago and beyond.
4. *Teuthis virgata.* Oblique lines and spots on the snout, blue spots on the upper third of the body: a wide brown blue-edged ocular band, and another from the spinous dorsal to the base of the pectoral fin. Andamans to the Malay Archipelago and beyond.
5. *Teuthis concatenata.* Blue bands on the head: orange spots over the body. Andamans to the Malay Archipelago.
6. *Teuthis margaritifera.* Brownish-olive, with scattered small blue spots, and a dark shoulder-mark: some marks and lines on the vertical fins. Andamans to the Malay Archipelago and beyond.
7. *Teuthis sutor.* Body higher, otherwise very similar to the last. Spots larger, those on the sides with a dark centre: a dark shoulder-mark. Seychelles and Malabar.
8. *Teuthis oramin.* White spots over the body: a dark shoulder-mark and barred caudal fin. Seas of India to the Malay Archipelago and beyond.
9. *Teuthis stellata.* Greyish, with purplish angular spots: a dark shoulder-mark sometimes present. Red Sea through those of India.

1. Teuthis Java, Plate XXXIX, fig. 5.

Teuthis Java, Linn. Syst. i, p. 507; Gmel. Linn. p. 1362; Cantor, Catal. p. 207; Günther, Catal. iii, p. 315; Day, Fish. Malabar, p. 125.

Sparus spinus ? Russell, Fish. Vizag. ii, p. 2, and *Worahwah*, pl. 102.

Amphacanthus Javus, Cuv. and Val. x, p. 118; Bleeker, Verh. Bat. Gen. xxiii, Teuth. p. 9: Schleg. and Müll. Verh. Nat. Ges. Overz. Bezitt, p. 10; Kner, Novara Fische, p. 205.

Ottah, Tam.: *Thar-oar-dah*, Andam.; *Worahwah*, Tel.

B. v, D. $\frac{13}{10}$, P. 18, V. 2/3,*A. $\frac{7}{9}$, C. 19.

Length of head 4/21, of pectoral 1/6, of caudal 1/5, height of body 3/8 to 4/11 of the total length. *Eyes*—

* *Worah.* Tam.; *Nga-pron-ka*, Mugh.

† Rüppell states that in *T. sigana* they are absent.

diameter 1/3 to 2/7 in the length of head, $1\frac{1}{4}$ diameters from end of snout and also apart. Interorbital space rather elevated, with a central shallow groove which narrows anteriorly: anterior superior edge of orbit serrated. The maxilla extends to below the posterior nostril: horizontal edge of preopercle roughened. The height of the soft portion of the cheek equals that of the orbit, whilst it is one-half wider than deep. *Teeth*—generic. *Fins*—dorsal spines strong, their base occupying five-sevenths of that of the entire fin, the spines increase in length to the fourth, which is as long as the head excluding the snout, and slightly higher than the rays, from it they decrease to the last which equals the length of the snout: soft portion of fin (as well as of the anal) obliquely rounded: anal spines strong, increasing in length to the third which equals the longest in the dorsal fin, from thence they decrease to the sixth, but the seventh is longer and equal to the third: caudal emarginate, its central rays being equal to two-thirds of the length of the longest of the outer ones. *Scales*—minute. *Colours*—head, back, and sides of a dark brownish neutral tint, becoming lighter on the abdomen. On the head and back many pale grey rounded spots, becoming more elongated on the sides and abdomen. The upper spots are not so wide as the ground colour. No streaks on the head as a rule, but to this there are exceptions, and in some instances the cheeks are reticulated: fins immaculate.

This doubtless is *Hepatus*, Gronov. Zooph. t. 8, fig. 4, and probably *Amphacanthus Russellii*, Bleeker.

Habitat.—Seas of India to the Malay Archipelago and beyond. Jerdon (M. J. L. and S. 1851, p. 138) mentions having procured both of Russell's species at Madras.

2. Teuthis vermiculata, Plate XL, fig. 1.

Amphacanthus vermiculatus, (Kuhl. and v. Hass.) Cuv. and Val. x, p. 126: Müll. and Schleg. Verh. Overz. Bez. Vissch. p. 11, pl. 3, fig. 3; Bleeker, Verh. Bat. Gen. xxiii, Teuth. p. 11.

Teuthis vermiculata, Günther, Catal. iii, p. 317; Day, Fishes of Malabar, p. 123.

Kut-e-rah, Mal.: *Chow-lud-dah*, Andam.

B. v, D. $\frac{13}{9-10}$, P. 16, V. 2/3, A. $\frac{7}{8-9}$, C. 17.

Length of head about 1/5, of caudal 2/13, height of body 3/7 to 2/5 of the total length. *Eyes*—diameter $3\frac{1}{3}$ in the length of head, upwards of $1\frac{1}{2}$ diameters from end of snout, and $1\frac{1}{3}$ apart. The maxilla reaches about half way to below the front edge of the orbit. Angle of preopercle slightly produced. *Teeth*—generic. *Fins*—Dorsal spines strong and occupying five-sevenths of the length of the base of the entire fin, from the fourth they are of about the same height, equalling half the length of the head, but are not so high as the first few rays: rayed portion of the fin angular: anal of the same form as the dorsal, but the spines are stronger and occupy three-fifths of the entire base of the fin, they are of about the same height from the third, equalling half the length of the head: pectoral two-fifths of the height of the body and longer than the ventral which does not quite reach the anal fin: caudal slightly emarginate. *Scales*—minute, but distinct over the body and cheeks. *Colours*—light brown, running into bluish green on the back, and nearly white on the abdomen. The whole of the body, head, and lips are lineated with undulating bluish lines of about one-fourth the width of the ground colour, being broadest near the abdomen: caudal fin with brown lines.

Habitat.—Seas of India, Malay Archipelago and beyond, attaining at least 11 inches in length.

3. Teuthis marmorata, Plate XL, fig. 2.

Amphacanthus marmoratus, Quoy and Gaim. Voy. Uranie, Zool. p. 367, pl. 62, fig. 1; Cuv. and Val. x, p. 124; Kner, Novara Fische, p. 208.

Teuthis marmorata, Günther, Catal. iii, p. 322.

Teuthis striolata, Günther, Catal. iii, p. 319, and Garrett, Fische d. Sudsee, t. 59, fig. A.

B. v, D. $\frac{13}{10}$, P. 18, V. 2/3, A. $\frac{7}{9}$, C. 17.

Length of head 3/16 to 1/5, of caudal 1/7, height of body 3/10 to 2/7 of the total length. *Eyes*—diameter 1/3 of length of head, 1 to $1\frac{1}{4}$ diameters from end of snout, and 1 apart. Interorbital space nearly flat, edge of orbit entire. The maxilla reaches to nearly below the hind nostril. The soft portion of the cheek (between the orbit, preopercular limb, and hind edge of preorbital and maxilla) is as high as the orbit, and but slightly longer than high. *Teeth*—generic. *Fins*—dorsal spines of moderate strength, increasing to the fourth and subsequently decreasing from the seventh, the highest spines equalling the length of the head behind the first third of the eyes, and being half as long again as the soft portion of the fin which is rounded: pectorals as long as the head excluding its post-orbital portion: ventral reaches more than half way to the anal: anal spines increase in length to the third, (which equals half the length of the head,) from whence they decrease to the last, which equals two-fifths of the same extent: caudal lobed, upper lobe the longer. *Colours*—brownish, covered all over the back with blue vermiculated lines, which become sinuously-longitudinal along the sides: head covered with similar lines. Dorsal, anal, and caudal with sinuous brown lines: pectorals yellow.

Habitat.—Seas of India to the Malay Archipelago.

4. Teuthis virgata, Plate XL, fig. 3.

Amphacanthus virgatus, Cuv. and Val. x, p. 133; Müll. and Schleg. Verh. Overz. Bez. Vissch. p. 14, pl. 3, fig. 1; Bleeker, Verh. Bat. Gen. xxiii, Teuth. p. 11; Kner, Novara Fische, p. 209.

Teuthis virgata, Günther, Catal. iii, p. 323.

Tah-meer-dah, Andam.

B. v, D. $\frac{13}{10}$, P. 17, V. 2/3, A. $\frac{7}{9}$, C. 17, Cæc. pyl. 4.

Length of head 2/9, of caudal 2/9, height of body 2/5 to 3/7 of the total length. *Eyes*—diameter 1/3 of length of head, $1\frac{1}{3}$ diameters from end of snout, and $1\frac{1}{4}$ apart. A slight protuberance over the eyes: no serrations to orbit. The maxilla reaches to below the posterior nostril. Angle of preopercle slightly produced. *Teeth*—generic. *Fins*—dorsal spines rather strong, increasing in length to the fifth, from whence they remain of about the same height to the seventh, after which they decrease; the longest spines equal that of the head excluding the snout, and are of the same height as the longest of the rays, the soft portion rather angular: pectoral as long as the head excluding its post-orbital portion: ventral does not reach the anal: anal spines increase in length to the fourth, from which they continue of about the same length, or equal to the longest in the dorsal fin: caudal emarginate. *Scales*—minute. *Colours*—some oblique blue lines and spots on the snout. Upper two-thirds of body coppery yellow, covered with round blue spots, and having blue lines on the head. A brown band, as wide as orbit, extends from before the dorsal fin through the eye to below the jaws; a second from the sixth and seventh dorsal spines to the base of the pectoral, both these bands are edged with blue. Fins yellowish.

Habitat.—Andamans (where the specimen figured was taken) to the Malay Archipelago, and beyond.

5. **Teuthis concatenata**, Plate XL, fig. 4.

Amphacanthus concatenatus, Cuv. and Val. x, p. 127; Bleeker, Amboina, p. 46.
Teuthis concatenata, Cantor, Catal. p. 208; Günther, Catal. iii, p. 316.
Thar-oar-dah, Andam.

B. v, D. $\frac{13}{10}$, P. 18, V. 2/3, A. $\frac{7}{9}$, C. 18, Cæc. pyl. 5-6, Vert. 10/13.

Length of head 4/19, of caudal 4/21, height of body 3/8 to 2/5 of the total length. *Eyes*—diameter 1/3 of length of head, $1\frac{1}{3}$ diameters from end of snout, and $1\frac{1}{4}$ apart. Dorsal profile more convex than that of the abdomen. Interorbital space with a broad shallow groove along its whole extent, bounded on either side by a low ridge: anterior-superior angle of the orbit feebly serrated: preopercular angle slightly produced. Soft portion of the cheek as deep as wide, and equal to 1 diameter of the orbit. *Teeth*—generic. *Fins*—dorsal spines increase in length to the fifth, which equals the length of the head excluding the snout; they subsequently slightly decrease to the twelfth, but the last is a little longer: soft portion of dorsal and anal fins angular and rather higher than the longest spine: pectoral almost as long as the head: ventral reaches the anal spines: anal spines increase in length to the third, which equals the highest in the dorsal fin, the last spine is a little longer: caudal emarginate. *Scales*—larger than in most of the known species. *Colours*—dark, greyish-brown, covered all over with light orange spots, which along the back are larger than the interspaces, but decrease in size towards the abdomen. A broad blue band extends from below the orbit to the angle of the mouth, and another passes along the preopercle: brown spots on the caudal fin.

Habitat.—Andaman islands and Malay Archipelago.

6. **Teuthis margaritifera**, Plate XL, fig. 5.

Amphacanthus margaritiferus, Cuv. and Val. x, p. 145; Bleeker, Java, iv, p. 334; Kner, Novara Fische, p. 206.
Teuthis margaritifera, Günther, Catal. iii, p. 317.

B. v, D. $\frac{13}{10}$, P. 17, V. 2/3, A. $\frac{7}{9}$, C. 17, Vert. 10/13.

Length of head 4/21, of caudal 2/11, height of body 4/13 to 2/7 of the total length. *Eyes*—diameter 1/3 of length of head, $1\frac{1}{4}$ diameters from end of snout, and also apart. Dorsal and abdominal profiles equally convex. The maxilla reaches to below the posterior nostril. Interorbital space nearly flat: no serrations along the edge of orbit. Soft portions of the cheek two-thirds as high as the orbit is long, and half longer than high. Angle of preopercle slightly produced. *Teeth*—generic. *Fins*—dorsal spines rather weak, increasing in length to the fifth which is a little above half the length of the head and one-third longer than the rays, subsequently they decrease to the last which equals the diameter of the orbit in length: pectoral rather pointed and as long as the head excluding its post-orbital portion: ventral does not reach the anal spines: third and fourth anal spines slightly longer than the second and equal to the third of the dorsal fin, from thence they decrease to the last which equals $1\frac{1}{4}$ diameter of the orbit in length: caudal lobed, the upper the longer, central caudal rays two-thirds as long as the longest of the outer ones. *Scales*—minute. *Colours*—brownish-olive, with small scattered blue spots on the back and sides, much smaller than the interspaces: a dark oval shoulder-mark: some dark lines on the spinous dorsal: soft dorsal and anal with brown spots.

Habitat.—Andamans to the Malay Archipelago and beyond.

7. **Teuthis sutor.**

? *Buro brunneus*, Comm. V.
Amphacanthus sutor, Cuv. and Val. x, p. 148.
Teuthis sutor, Günther, Catal. iii, p. 317; Day, Fish. Malabar, p. 126.
Teuthis margaritifera, Playfair, Proc. Zool. Soc. 1867, p. 855 (not Cuv. and Val.).

B. v, D. $\frac{13}{10\,(14)}$, P. 16, V. 2/3, A. $\frac{7}{9\,(10)}$, C. 17.

Length of head 2/11, of caudal 2/11, height of body 4/11 of the total length. *Eyes*—diameter 2/7 of length of head, $1\frac{1}{3}$ diameters from end of snout, and $1\frac{1}{4}$ apart. The maxilla reaches to below the front nostril. Anterior-superior edge of orbit indistinctly serrated. *Fins*—fifth dorsal spine the longest and equal to half the length of the head, from it they decrease to the last which equals $1\frac{1}{4}$ diameters of the orbit in length: third anal spine the longest equalling half the length of the head, from it they decrease to the last which is only two-fifths of the same distance: caudal emarginate, the central rays two and a quarter in the length of the outer ones. *Colours*—light brown, with pale blue spots, those in the middle of the side being the largest and having brown centres: a dark blotch on the shoulder.

In Cuv. and Val. it is observed as closely resembling *A. margaritiferus*, but having its pectorals a little more short and rounded.

Habitat.—Seychelles and coast of Malabar: the foregoing description is from Colonel Playfair's specimen, 11 inches in length, captured at the Seychelles.

8. Teuthis oramin, Plate XL, fig. 6.

Amphacanthus guttatus, var. *oramin*, Bl. Schn. p. 207, t. 48.
Amphacanthus albopunctatus, Temm. and Schleg. Fauna Japon. Poiss. p. 128.
Teuthis brevirostris, Gronov. ed. Gray, p. 142.
Teuthis oramin, Günther, Catal. iii, p. 318.
Teuthis albopunctata, Günther, Catal. iii, p. 318.

B. v, D. $\frac{13}{10}$, P. 16, V. 2/3, A. $\frac{7}{9}$, C. 17.

Length of head from $4\frac{3}{4}$ to $5\frac{1}{4}$, of caudal 1/5, height of body 1/3 to $3\frac{1}{4}$ in the total length. *Eyes*—diameter $2\frac{3}{4}$ in the length of head, 1 to $1\frac{1}{4}$ diameters from end of snout, and 1 apart. Interorbital space flat, anterior-superior edge of the orbit very finely serrated. The maxilla reaches to below the posterior nostril. The preopercular angle slightly produced: the soft portion of the cheek as high as the orbit and half longer than high. *Teeth*—generic. *Fins*—dorsal spines rather weak, increasing in length to the fourth which equals the length of the head excluding the snout, and is nearly twice as long as the rays, subsequently they decrease to the last which is only two-fifths of the length of the head: pectoral as long as the head excluding its postorbital portion: ventrals do not reach the anal: anal spines increase to the third and fourth which equal the highest in the dorsal fin, they subsequently decrease to the last which equals $1\frac{1}{2}$ diameters of the orbit in length: caudal with pointed lobes, the central rays being equal to two-thirds of the length of the outer ones. *Scales*—very minute. *Colours*—olivaceous, with indistinct longitudinal stripes in the upper half of the body, below silvery-white. A round black shoulder spot, and a black spot at the top of the eye: numerous pearl white spots on the upper half of the body. Dorsal fin spotted with brown: caudal with four or five vertical bars and a black outer edge. Spinous portion of anal with large black spots, the soft irregularly lineated: pectorals orange. In specimens over 7 or 8 inches in length, the markings on the fins generally become obsolete, the white spots on the body decrease in number, and have a blue tinge. The shoulder spot becomes dark, but the spot on the upper edge of the eye remains.

The black shoulder spot has been omitted in Bl. Schneider's figure, which otherwise is not incorrect: when freshly captured the bars across the caudal fin are very distinct.

Dr. Günther observes, "Professor Peters has informed us that the dried typical specimen mentioned by Schneider appears to have been lost." (l. c. p. 318). It must however be added that Schneider's specimen in spirit is still in good preservation at Berlin.

Habitat.—Common along the coasts of India, attaining at least nine inches in length. If it is the same as *Amphacanthus dorsalis*, C.V.=*Teuthis dorsalis*, Cantor, it would appear to be found at Pinang and Java.

9. Teuthis stellata.

Scarus stellatus, Forsk. p. 26, No. 10.
Amphacanthus stellatus, Bl. Schn. p. 209; Rüpp. N. W. Fische, p. 129.
Amphacanthus punctatus, Rüpp. Atl. Fische, p. 46, pl. 11, f. 2 (not Bl. Schn.)
Amphacanthus nuchalis, Cuv. and Val. x, p. 140.
Teuthis stellata, Günther, Catal. iii, p. 320.

B. v, D. $\frac{13}{10}$, P. 16, V. 2/3, A. $\frac{7}{9}$, C. 19.

Length of head nearly 1/4, of caudal 1/4, height of body about 1/3 of the total length. *Eyes*—diameter 1/3 of length of head, $1\frac{1}{2}$ diameters from end of snout, and $1\frac{1}{4}$ apart. The maxilla reaches to below the hind nostril. *Fins*—fourth dorsal spine the highest, soft dorsal and anal rather pointed: last anal spine the longest: caudal deeply lobed, the upper the longer. *Colours*—greyish, covered all over with small angular spots of a purplish-brown colour: a greenish-yellow spot in front of the dorsal fin: a dark shoulder spot sometimes present: dorsal and anal fins spotted with brown, the border of the soft rays and of the caudal yellowish.

A specimen in the Calcutta Museum from the Red Sea has fine white upper edges and dark lower ones to the spots on the body.

Habitat.—Red Sea, through those of India.

FAMILY, IX—BERYCIDÆ, *Lowe.*

Holocentrinæ, pt. Swainson.

Branchiostegals from four to eight: pseudobranchiæ present. Form of body oblong, or rather elevated and compressed. Opercles more or less armed. Head with large muciferous cavities. Eyes large, lateral. Cleft of mouth more or less oblique, extending to the sides of the muzzle. Teeth more or less villiform in both jaws, and usually so on the palate. Dorsal fin, when single, having the spinous portion of less extent than the soft, or with isolated spines in front of the fin: or there may be two dorsals, the first being spinous. Ventrals thoracic, each with either less or more than five soft rays. Scales ctenoid, seldom bony or absent: none on the head. Pyloric appendages numerous or in moderate numbers.

SYNOPSIS OF GENERA.

1. *Myripristis.* Branchiostegals seven to eight. Bones of the head serrated, no large spine at the angle of the preopercle. Tropical seas.
2. *Holocentrum.* Branchiostegals eight. Bones of the head serrated: a long, strong, spine at the angle of the preopercle. Tropical seas.

Genus, 1—MYRIPRISTIS, *Cuv.*

Branchiostegals usually eight, more rarely seven: pseudobranchiæ well developed. Eyes large, mostly lateral. Muzzle short, lower jaw prominent. Cleft of mouth oblique, in one species horizontal. Opercular pieces serrated: opercle generally with one spine, none on the preopercle. Teeth villiform on jaws, vomer, and palatines, there may be an outer widely separated row of small obtusely conical ones in the jaws. Two dorsal fins, scarcely united: ventral with one spine and seven rays: anal with four spines: caudal forked. Scales large, ctenoid. Air-vessel transversely contracted near its centre. Pyloric appendages in moderate numbers.

Although considerable prominence has been given to the presence or absence of black marks on the fins in species of this genus, I am convinced that it is subject to great variation, and present or absent in the same species.

Geographical distribution.—Tropical seas.

SYNOPSIS OF SPECIES.

1. *Myripristis botche*, D. 10 | $\frac{1}{14-16}$, A. $\frac{4}{12-13}$, L. l. 28-30, L. tr. 3/7½. Soft dorsal, anal, and caudal black edged, first dorsal also often more or less black. A dark opercular and axillary mark. East coast of Africa, seas of India to the Malay Archipelago and beyond.
2. *Myripristis murdjan*, D. 10 | $\frac{1}{14-15}$, A. $\frac{4}{12-13}$, L. l. 28-30, L. tr. 3½/7½. Red, with a dark mark at the gills and axilla. East coast of Africa, seas of India to the Malay Archipelago and beyond.

1. **Myripristis botche,** Plate XLI, fig. 1.

Sparus botche, Russell, Fish. Vizag. ii, p. 4, pl. cv.

Myripristis botche, Cuv. and Val. iii, p. 181; (Bleeker, Perc. p. 52, Kner, Novara Fische, p. 5, t. i, f. 1, not synon.)*

Myripristis adustus, Bleeker, Amboina, p. 108, Revis. Myrip. 1871, p. 16; Günther, Catal. i, p. 22; Playfair, Fish. Zanzibar, p. 51.

B. viii, D. 10 | $\frac{1}{14-16}$, P. 15, V. 1/7, A. $\frac{4}{12-13}$, C. 19, L. l. 28-30, L. tr. 3/7½.

Length of head 4/15, of caudal nearly 1/5, height of body nearly 1/3 of the total length. *Eyes*—diameter 2½ to 2¾ in the length of the head, 1/2 a diameter from end of snout, and 3/4 apart or nearly 1/4 in the length of the head. Head slightly longer than high. Chin prominent: the maxilla, which is not denticulated, reaches to below the last third of the orbit. Under surface of lower jaw roughly and irregularly furrowed: pre- and sub-orbitals serrated, also both limbs of the preopercle: a moderately strong opercular spine with two or three above and below it; the lower half of the opercle, the sub- and the inter-opercles serrated. *Teeth*—villiform. *Fins*—dorsal spines weak, the longest being half the length of the head: second dorsal higher than the first: pectoral equals the length of the head behind the front third of the orbit: the ventral reaches two-thirds of the way to the anal: fourth anal spine the longest and equalling the diameter of the orbit but not so strong as the third: caudal forked. *Scales*—seven to eight rows anterior to the dorsal fin: seven along the preopercle: two entire and two half rows between the lateral-line and the base of the dorsal fin. Free portion of the tail rather higher than long. *Colours*—scarlet, the edges of the scales violet, more especially above the lateral-line: longitudinal bands, alternately lighter and darker along each row of scales. First dorsal black, or black with a light longitudinal band, or simply rose-coloured: the other fins pinkish, with the outer third of the soft dorsal, anal, and caudal lobes black, which amount is sometimes reduced to a mere

* This species has been named *M. macrolepis* by Bleeker, Revis. Myr. p. 18.

spot. A deep black spot behind the gill-opening, a dark mark in the axilla. In some rare instances a dark spot may exist on the upper edge of the eye.

I have only collected two species of this genus on the Coromandel coast of India (see pl. xli.), and am of opinion that they are the two that Russell (plates civ. and cv.) obtained from the same place. Russell distinctly shows one has a band on its eye, pl. civ. (see also pl. xli. f. 2.) The one with the banded eye is by far the commonest, and I consider it as *M. murdjan*.

The second species is easily recognised by its more or less black fins, and appears to be *M. adustus*. Admitting that Russell's description does not coincide, neither does it with his own figure. He gives B. viii, D. $\frac{11}{13}$ ($\frac{11}{25}$), P. 15, V. 1/7 ($\frac{1}{8}$), A. $\frac{4}{6}$ ($\frac{4}{10}$), C. 21; his figure gives D. $\frac{11}{14}$, A. $\frac{4}{11}$, demonstrating that his numbers are not trustworthy.

Jerdon (M. J. L. and Sc. 1851, p. 131) observes: "*Myripristis botche*, C. V. *Moondu kun kakasi*, Tam. Russell, 105."

Dr. Günther, Catal. i, p. 21, considers Russell's fish (pl. cv.) is identical with *M. murdjan*, but Bleeker points out that the colours in the two are very differently disposed on the fins.

Habitat.—East coast of Africa, seas of India to the Malay Archipelago and beyond. The specimen figured is $8\frac{1}{2}$ inches in length and from the Coromandel coast of India. It is not nearly so common as the *M. murdjan*.

2. Myripristis murdjan, Plate XLI, fig. 2.

Sciæna murdjan, Forsk. p. 48; Gmel. Linn. p. 1301.

Perca murdjan, Bl. Schn. p. 86; Lacép. pp. 396, 418.

Sparus sullaneroo-kuntee, Russell, Fish. Vizag. ii, p. 3, pl. civ.

Myripristis murdjan, Rüpp. Fische Roth. Meer. p. 86, t. xxiii, f. 2, and N. W. F. p. 95; Cuv. and Val. iii, p. 177 and vii, p. 495; Bleeker, Amb. p. 109, and Révis. Myrip. 1871, p. 11; Günther, Catal. i, p. 21; Kner, Novara Fische, p. 4; Playfair, Fish. Zanz. p. 51 (part); Klunz. Fische Roth. Meer, Verh. z. b. Ges. Wien, 1870, p. 726.

Myripristis melanophrys, Swains. Fish. ii, p. 207.

B. viii, D. 10 | $\frac{1}{14-15}$, P. 15, V. 1/7, A. $\frac{4}{12-13}$, C. 19, L. l. 28-30, L. tr. $3\frac{1}{2}/7\frac{1}{2}$.

Length of head $3\frac{1}{4}$ to $3\frac{1}{2}$, of caudal from 1/5 to 2/9, height of body from 1/3 to $3\frac{1}{4}$ in the total length. *Eyes*—diameter $2\frac{1}{4}$ to $2\frac{1}{2}$ in length of head, 1/3 of a diameter from end of snout, and about 1/2 a diameter apart, the width of the interorbital space equalling from 1/4 to $4\frac{1}{4}$ in the length of the head. Posterior edge of hind nostril usually serrated in the young. Lower jaw slightly the longer, having a rough, nipple-like projection on either side of the symphysis. The maxilla reaches to beneath the last third of the orbit, it has some blunt denticulations on its front near its lower end. Under surface of lower jaw furrowed by ten or twelve grooves: the maxilla, pre- sub- and inter-opercles also grooved. Preopercle serrated in its whole extent. Interopercle finely denticulated: opercle with a moderately strong spine, having a few denticulations above it, and the whole of its outer margin below it serrated. Sub-opercle with an emargination opposite the base of the pectoral fin. Shoulder-scale serrated. Upper surface of the head roughened by three or four raised lines, which, passing backwards, divide and subdivide, each terminating in a small spine. *Teeth*—villiform in the jaws, with an external row of widely separated ones which are larger and conically rounded, none on the tongue. *Fins*—dorsal spines increasing in length to the third which is about the same height as the three next or equal to one diameter of the orbit, the interspinous membrane rather deeply emarginate, front portion of the second dorsal higher than the first. Pectoral as long as the head behind the middle of the eye in the adult, longer in the young: ventral reaches two-thirds of the distance to the anal. Third anal spine the strongest but the fourth the longest and equal to 2/5 to one-third in the length of the head: caudal forked. Free portion of the tail about as high at its base as it is long. *Scales*—about seven rows along the preopercle. *Colours*—roseate, gill openings deep brownish-black, or else like coagulated blood, a dark mark in the axilla. A dark vertical band through the eye, sometimes confined to above the pupil. Dorsal, caudal, and anal fins with milk-white outer edges; a dark mark, often deep black, may be present or absent at the highest points of the soft dorsal and anal fins, also at the tips of the caudal. Rarely there is a dark mark along the first dorsal. Outer edge of ventral white.

Myripristis kuntee, Cuv. and Val. vii, p. 487, was considered in the Hist. Nat. des Poissons to be identical with Russell's fish, a conclusion doubted by Bleeker, whilst Dr. Günther considers it closely allied to *M. pralinius*, C. V.

Habitat.—From the Red Sea and East coast of Africa, through the seas of India to the Malay Archipelago and beyond. The specimen figured is a little over 6 inches in length, and from Madras: my longest is $11\frac{1}{4}$ inches long. It is very common at Madras especially about February.

Genus, 2—HOLOCENTRUM, *Artedi*.

Rhynchichthys, Cuv. and Val. (*young**); *Corniger*, Agassiz.

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* The genus *Rhynchichthys*, Cuv. and Val., is probably formed of the young of *some* of these species, and is distinguished by an elongated, pointed, and more or less transparent snout, the same as is perceived in some immature fresh water Indian siluroids. A small

Branchiostegals eight. Eyes large, lateral. Jaws of equal length, or the lower slightly the longer: snout of moderate length. Opercles and suborbitals serrated: opercle with two spines: generally a large spine at the angle of the preopercle. Villiform teeth on the jaws, vomer, and palatines. Two dorsal fins scarcely united: ventral with one spine and seven rays: anal with four spines, the third being long and strong: caudal forked. Scales ctenoid, of moderate size. Air-vessel oval and simple. Pyloric appendages numerous.

Bleeker observes that amongst the characters by which these fishes may be distinguished one from another, especial notice should be taken of the number of rows of scales on the preopercle, the relative height of the two last dorsal spines, and the presence or absence of spines at the margin of the nostrils or the end of the snout. To show that these intra-nasal spines are not invariable I would refer to *H. Andamanense*, p. 172. It appears that in some at least of the species of *Holocentrum*, the comparative length of the preopercular spine to that of the body increases with age, whereas, as already observed (p. 9) in *Serrani* or *Lutiani* (p. 29), when one exists at this spot in the immature it becomes more or less absorbed in the adult.

SYNOPSIS OF SPECIES.

1. *Holocentrum diadema*, D. 11 | $\frac{1}{13}$, A. $\frac{4}{9}$, L. l. 47-48, L. tr. 3/7. Width of interorbital space 1/4 of length of head. No intra-nasal or rostral spine. Red, with silvery bands. Red Sea, East coast of Africa, seas of India to China.

2. *Holocentrum Andamanense*, D. 11 | 15, A. $\frac{4}{9}$, L. l. 42, L. tr. $3\frac{1}{2}/7\frac{1}{2}$. Width of interorbital space about 1/5 of length of head. Intra-nasal spine present or absent: a rostral one bifid at its extremity. Uniform rosy-scarlet. Andamans.

3. *Holocentrum caudimaculatum*, D. 11 | 13-14, A. $\frac{4}{9}$, L. l. 40-43, L. tr. $3\frac{1}{2}/7\frac{1}{2}$. Width of interorbital space about 1/5 of length of head. Intra-nasal and rostral spines present, Red, with longitudinal violet bands, a white spot on the free portion of the tail behind the end of the dorsal fin. Red Sea, seas of India to the Malay Archipelago.

4. *Holocentrum rubrum*, D. 11 | 12-13, A. $\frac{4}{9}$, L. l. 35-39, L. tr. $3/6\frac{1}{2}$. Width of interorbital space from 2/7 to 1/4 of length of head. No intra-nasal spines, but rostral ones present. Red, with more or less longitudinal bands: fins sometimes with dark marks.

5. *Holocentrum sammara*, D. 10 | $\frac{1}{11-12}$, A. $\frac{4}{7-8}$, L. l. 39-40, L. tr. 3/7. Width of interorbital space from $3\frac{1}{3}$ to 1/4 of length of head. No intra-nasal spines, but rostral ones present. Red, with or without violet longitudinal bands: usually a dark mark between the first four dorsal spines, and a dark spot at the base of each spine: vertical fins usually with some dark markings.

1. Holocentrum diadema.

Holocentrus diadema, Lacép. iv, pp. 372, 374, pl. 32, fig. 3; Rüppell, Atl. Fische, p. 84, t. xxii, f. 2.

Holocentrum diadema, Cuv. and Val. iii, p. 213; Less. Voy. Duperr. Zool. ii, p. 220, t. xxv, fig. 2; Bleeker, Moluc. p. 259, and Révis. Holoc. p. 13; Günther, Catal. i, p. 42; Klunz. Fische Roth. Meer. Verh. z. b. Ges. Wien, 1870, p. 723.

B. viii, D. 11 | $\frac{1}{13}$, P. 13, V. 1/7, A. $\frac{4}{9}$, C. 19, L. l. 47-48, L. tr. 3/7, Vert. 11/16.

Length of head 2/7, of pectoral 2/9, of caudal 1/6, height of body $3\frac{1}{2}$ to $3\frac{2}{3}$ in the total length. *Eyes*—diameter 2 to $2\frac{1}{2}$ in the length of the head, 1/2 a diameter from the end of snout, and from 1/2 to 2/3 of a diameter apart, the width of the interorbital space being about 1/4 of the length of the head. The height of the head equals its length without the snout; its width equals half its length. The maxilla reaches to below the anterior third of the orbit. Opercles, preorbital, and suborbitals denticulated, as is also the posterior half of the upper edge of the orbit. Lower edge of preorbital serrated and having a strong blunt spinate projection, directed downwards and forwards. Upper opercular spine the longest and strongest, but not equalling that on the preopercle. The posterior edge of the preopercle and the lower ones of the sub- inter- pre- and opercle spinate. No spines at

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specimen of *Holocentrum* (*H. platyrhinum*, Klunz. $1\frac{4}{5}$ inches long) exists in the Berlin Museum, and does not possess this elongation of the snout, the latter being nearly 1/2 a diameter of the eye in length. The following may be the fry of a *Holocentrum* (? *rubrum*).

Rhynchichthys ornatus.

Day, Proc. Zool. Society, 1868, p. 149.

B. viii, D. 11/12, P. 15, V. 1/7, A. $\frac{4}{9}$, C. 17, L. l. 38, L. tr. 3/7.

Length of head $3\frac{1}{3}$, of pectoral 1/6, height of body $3\frac{1}{3}$ in the total length. *Eyes*—diameter 2/5 of length of head, 1/2 a diameter from end of snout, the width of the interorbital space equalling nearly 1/3 of the length of the head. Height of head nearly equal to its length. Upper jaw the longer, overhung by a projecting and transparent snout. The maxilla reaches to below the middle of the orbit. Preopercular spine equals about 1/2 the width of the orbit; the opercular pieces and shoulder-bone serrated, upper opercular spine the longer nearly equalling the length of that at the angle of the preopercle. *Teeth*—villiform. *Fins*—dorsal spines moderately strong, the second and third the longest equalling half the height of the body and much higher than the rays, its last two spines of about equal height, interspinous membrane deeply cleft. Third anal spine longest and strongest, equalling the one at the angle of the preopercle, caudal slightly forked. *Scales*—seven rows between the occiput and dorsal fin, and also along the preopercle. *Colours*—bluish-silvery along the back and sides, rosy on the abdomen; dorsal orange, with black spines; interspinous membrane between the first three spines and also between the sixth and last of a deep black colour, the other fins yellowish.

Habitat.—Madras, to $1\frac{2}{5}$ inches in length.

nostrils nor end of snout. *Fins*—the fourth to the sixth dorsal spines the longest and equal to about half the height of the body, interspinous membrane deeply cleft: the two dorsal fins of about the same height. Ventral reaches the vent. Third anal spine the longest and equal from about 1/5 of the total length in young specimens to 1/6 in adults. Caudal forked. *Scales*—not fluted, eight rows between the occiput and the base of the dorsal fin: seven or eight rows along the preopercle. *Colours*—red, with from eight to eleven longitudinal silvery bands: spinous dorsal brownish black, having a white longitudinal band, the other fins rosy.

Habitat.—Red Sea, East coast of Africa, seas of India, to the Malay Archipelago, China and beyond.

2. Holocentrum Andamanense, Plate XLI, fig. 3.

Day, Proc. Zool. Soc. 1870, p. 686.

B. viii, D. 11 | 15, P. 17, V. 1/7, A. $\frac{4}{9}$, C. 22, L. l. 42, L. tr. $3\frac{1}{2}/7\frac{1}{2}$.

Length of head 4/13 to 2/7, of caudal 1/6, height of body $3\frac{1}{4}$ to $3\frac{1}{3}$ in the total length. *Eyes*—diameter 2/7 to $3\frac{3}{4}$ in length of head, 1 diameter from end of snout, and 3/4 apart, the width of the interorbital space being not quite 1/5 of that of the head. Height of head equals its length behind the posterior nostril: dorsal profile over the eyes slightly concave. Lower jaw a little the longer. The maxilla reaches to below the first third or middle of the orbit. The posterior process of the premaxillary extends to opposite the first third of the eye. Vertical and horizontal limbs of preopercle rather finely denticulated, and with an entire but fluted spine at its angle as long or 1/2 longer than the orbit. Opercle with two or three flat spines, the upper or central one being the longest, the margin of the opercle below it spinate. Sub- and inter-opercles wholly or partially serrated: preorbital with two or three triangular tooth-like processes directed downwards along its lower border, and the interspace serrated. Shoulder-bone rather strongly serrated. A spine directed inwards and rather upwards at the left nostril of one specimen, not on the right side nor in the other specimen, a bifid spine on either side at end of snout. *Teeth*—villiform, none on the tongue. *Fins*—third to fifth dorsal spines the highest and equal to the length of the postorbital portion of the head, the last spine much the shortest being less than half the diameter of the orbit in height, interspinous membrane very slightly notched. Pectoral reaching to the thirteenth scale. Third anal spine the strongest and equal to 1/6 of the total length. Caudal deeply forked. Free portion of the tail as high at its commencement as it is long. *Scales*—$3\frac{1}{2}$ rows between the lateral line and the dorsal spines, six before the dorsal fin, and seven or eight rows along the preopercle. *Colours*—uniform rosy-scarlet.

Habitat.—Andamans, from whence two specimens were procured, the longest (figured) being nine inches in length.

3. Holocentrum caudimaculatum.

Holocentrus spinifer, Rüpp. Atl. p. 86, t. xxiii, fig. 1 (not N. W. Fische, p. 97).
Holocentrus caudimaculatus, Rüpp. N. W. Fische, p. 97.
Holocentrum spiniferum, Cuv. and Val. iii, p. 206, vii, p. 498.
Holocentrus ruber, Bennett, Fish. Ceylon, p. 4, t. iv.
Holocentrum caudimaculatum, Günther, Catal. i, p. 41, and Garrett, Fische d. Sudsee, p. 95; Playfair, P. Z. S. 1867, p. 855; Klunz. Fische Roth. Meer, 1870, p. 724; Bleeker, Révis. Holoc. p. 22.
Holocentrum leonoides, Bleeker, Celebes, p. 71, and Perc. p. 54.

B. viii, D. 11 | 13-14, P. 14, V. 1/7, A. $\frac{4}{9}$, C. 19, L. l. 40-43, L. tr. $3\frac{1}{2}/7\frac{1}{2}$.

Length of head $3\frac{1}{3}$, of pectoral 1/5, of caudal $4\frac{1}{2}$, height of body 1/3 to $3\frac{1}{4}$ in the total length. *Eyes*—diameter 2/5 to 1/3 of the length of head, from 1/2 to 2/3 of a diameter apart and also from the end of snout, the width of the interorbital space about 1/5 of the length of the head. Height of the head equals its length excluding the snout, and its width equals half its length. Jaws of about equal length anteriorly, the maxilla reaches to below the middle of the orbit. Preorbital serrated and anteriorly with a rather large blunt spine pointing downwards. Opercular bones serrated, the upper opercular spine the longer: the preopercular spine as long as or longer than the orbit. Shoulder-bone serrated. Two intra-nasal spines. *Teeth*—villiform. *Fins*—the fourth dorsal spine the longest and equal to about 2/5 of the height of the body, but not so high as the soft dorsal: dorsal interspinous membrane rather deeply emarginate. Third anal spine longest and strongest equalling about 2/9 of the total length. Caudal forked. *Scales*—seven or eight rows between the occiput and the base of the dorsal fin: seven or eight rows along the preopercle. *Colours*—red, more or less longitudinally banded with violet, and having a white spot over the free portion of the tail behind the end of the dorsal fin.

Habitat.—Red Sea, seas of India to the Malay Archipelago.

4. Holocentrum rubrum, Plate XLI, fig. 4.

Sciæna rubra, Forsk. p. 48 (not Bl. Schn.)
Perca rubra, Bl. Schn. p. 90.
Perca praslin, Lacép. iv, p. 418.
Holocentre tétracanthe, Lacép. iv, p. 334.
Holocentrum alborubrum, Lacép. iv, p. 372; Richards. Ich. China, p. 223; Bleeker, Fish. Ind. Arch. p. 2.
Holocentrus ruber, Rüppell, Atl. p. 83, t. xxii, f. 1, and N. W. Fische. p. 96.
Holocentrum Orientale, Cuv. and Val. iii, p. 197, vii, p. 497; Bleeker, Perc. p. 53; Jerdon, M. J. L. and Sc. 1851, p. 131.
Holocentrum marginatum et laticeps, Cuv. and Val. iii, pp. 216, 211, and vii, p. 500 (not Günther).

Holocentrum spinosissimum, Rich. Ich. China, p. 223 (not Tem. and Schleg.).

Holocentrum rubrum, Günther, Catal. i, p. 35, and Garrett, Fische d. Sudsee, p. 96; Day, Fish. Malabar, p. 1; Kner, Novara Fische, p. 7; Playfair, Fish. Zanz. p. 52; Klunz. Verh. z. b. Ges. Wien, 1870, p. 722; Bleeker, Révis. Hol. 1871, p. 27.

Cul-kah-catchee, Tam.

B. viii, D. 11 | 12-13, P. 15, V. 1/7, A. $\frac{4}{9}$, C. 19, L. l. 35-39, L. tr. 3/6½, Cæc. pyl. 20, Vert. 11/16.

Length of head 2/7 to 3¾, of caudal 2/13, height of body 3¼ to 3½ in the total length. *Eyes*—diameter 2/7 to 2¾ in the length of head, 2/3 of a diameter from the end of snout, 3/4 of a diameter apart, the width of the interorbital space equalling from 2/7 to 1/4 of the length of the head. The maxilla reaches to below the centre of the orbit. The posterior process of the premaxillary shorter than the diameter of the eye. Upper surface of the head roughened with sinuons lines which posteriorly end in spinate points. Suborbital ring of bones narrow, fluted and serrated in their whole extent. Preopercle likewise fluted along its vertical limb, having a strong spine as long as the orbit at its angle and serrated along both limbs. Opercle evenly fluted, armed with two spines (the lower being the shorter) and its outer edge strongly serrated: sub- and inter-opercles fluted and denticulated: shoulder-bones denticulated. Snout with two sharp nipple-shaped spines on the preorbital and intermediate serrations: no spines at nostrils. *Teeth*—villiform. *Fins*—dorsal spines strong, the third to the fifth the longest, the third equalling half the height of the body, but not so high as the soft portion of the fin. Pectoral reaches to the twelfth scale of the lateral-line, and the ventral three-fourths of the way to the anus. Third anal spine very strong, its height equalling about 2/3 of the height of the body, whilst it is 2/9 to 1/5 longer than the fourth spine. Caudal forked. *Scales*—six or seven rows between the occiput and the base of the first dorsal fin: seven rows along the preopercle. *Colours*—in the *young* silvery white with longitudinal dull rosy bands from the opercles, the second and third coalescing. In the *adult* it is red with seven or eight silvery bands. Head more or less rosy as are also the fins. Occasionally there is a little dark about the latter.

In the Fishes of Zanzibar, "Var. b, has a large black blotch at the base of the soft dorsal and anal, a third at the root of the caudal, and a fourth at the axil of the pectoral. This is clearly identical with that described by Bleeker as *H. melanospilos*. These varieties are structurally identical, and the difference in coloration is probably a sexual one; one specimen of Var. b proved to be a male fish, at or near spawning time." (p. 52).

Respecting colour, the one I have figured, destitute of any black, was a male. Jerdon's specimen (*sem-pooram*, Tam.) has a black spot at the base of both soft dorsal and anal fins, and a third above the superior opercular spine, whilst the margin of the preopercle is dark-edged; it has no vestige of a spine inside the nostril, as exists in *Holocentrum melanospilus*, Bleeker.

Habitat.—Red Sea, East coast of Africa, through the seas of India to the Malay Archipelago and beyond.

5. Holocentrum sammara.

Sciæna sammara, Forsk. p. 48; Lacép. iv, p. 314.

Perca sammara, Bl. Schn. p. 89.

Labrus angulosus, Lacép. iii, p. 430, t. xxii, f. 1.

Holocentrus sammara, Rüpp. Atl. Fische, p. 85, t. xxii, f. 3.

Holocentrum sammara, Cuv. and Val. iii, p. 216; Bleeker, Perc. p. 33, Amb. p. 555, and Révis. Holoc. p. 16; Günther, Catal. i, p. 46; Kner, Novara Fische, p. 9; Klunz. Verh. z. b. Ges. Wien, 1870, p. 720.

Holocentrum Christianum, (Ehren.) Cuv. and Val. iii, p. 219.

? Holocentrum læve, Günther, Catal. i, p. 47.

Holocentrum Tahiticum, Kner, Novara Fische, p. 9, t. i, f. 2.

B. viii, D. 10 | $\frac{1}{11-12}$, P. 14, V. 1/7, A. $\frac{4}{7-8}$, C. 19, L. l. 39-40, L. tr. 3/7, Vert. 11/16.

Length of head 3½ to 3¾, of caudal 1/5, height of body 3½ to 1/4 of the total length. *Eyes*—diameter 2⅔ to 1/3 in the length of head, 2/3 of a diameter from end of snout, and also apart, the interorbital space being equal to 3⅓ to 1/4 of the length of the head. The height of the head equals its length excluding the snout: its width equals half its length. The lower jaw the longer: the maxilla reaches to below the middle of the eye. Both limbs of the preopercle serrated in their entire extent, the length of the preopercular spine equals about 1/3 of the diameter of the orbit. The external edges of all the opercles more or less serrated: two spines on the opercle, the upper of which is as large as the preopercular one, the lower rather smaller. Preorbital denticulations strong: suborbital likewise serrated. No spine at nostrils nor at the end of the snout. Shoulder-bone striated and serrated. *Teeth*—villiform. *Fins*—the dorsal spines from the second to the fourth are of about the same height and equal to 1⅔ in that of the body, subsequently they decrease to the tenth which is one-fourth of their height: interspinous membrane deeply emarginate: second dorsal highest anteriorly and rather higher than the highest dorsal spine. Pectoral nearly equals the head excluding the snout. Ventral reaches half way to the anal. Third anal spine strongest and longest, equalling from 5⅓ to 4⅓ in the total length. Caudal forked. *Scales*—six to seven rows between the occiput and the base of the dorsal fin: seven along the preopercle. *Colours*—body with or without longitudinal violet bands, which may be composed of spots. A black spot may be present on either cheek. Usually a black spot between the first four dorsal spines, and sometimes a light mark between the bases of each spine. Anterior edge of soft dorsal and anal, also usually upper and lower edge of caudal, violet.

Habitat.—Red Sea, East coast of Africa, seas of India to the Malay Archipelago and beyond.

Family, X—KURTIDÆ.

Branchiostegals seven: pseudobranchiæ absent. Body oblong and compressed. Eyes large. The infraorbital bones do not articulate with the preopercle. Cleft of mouth oblique: lower jaw prominent. Villiform teeth on jaws, vomer, and palatines. A single dorsal fin, the spinous portion being of less extent than the soft, some spines may even be rudimentary: anal elongated, with two or three spines: ventrals thoracic with one spine and five rays. Scales of moderate or small size. Air-vessel present. Pyloric appendages few.

SYNOPSIS OF GENERA.

1. *Kurtus.* Dorsal spines rudimentary, three anal ones. A horizontally directed spine between the ventral fins. Seas of India to the Malay Archipelago.

2. *Pempheris.* Six dorsal and three anal spines. Scales over the anal fin. Red Sea, seas of India to the Malay Archipelago.

Genus, 1—Kurtus, *Bloch.*

Branchiostegals seven: pseudobranchiæ absent. Body oblong and strongly compressed: back elevated. Cleft of mouth oblique and deep, the lower jaw prominent. Preopercle denticulated. Villiform teeth in the jaws, vomer, and palatines. A single dorsal fin of much shorter extent than the anal, its spines being rudimentary: between the ventrals is a horizontal backwardly directed spine. Scales very small. Air-vessel present, enclosed in a conical cavity made by the ribs, which are dilated, convex, and forming rings in contact with each other.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Kurtus Indicus.* D. $\frac{6-7}{13-14}$, A. $\frac{2}{31-33}$. Silvery. Seas of India to the Malay Archipelago and beyond.

1. Kurtus Indicus, Plate XLII, fig. 1.

Kurtus Indicus, Bl. t. 169; Gmel. Linn. p. 1184; Shaw, Zool. iv, p. 185, pl. 25; Bl. Schn. p. 163; Bleeker, Verh. Bat. Gen. xxiv, Makr. p. 78; Günther, Catal. ii, p. 510.

Kurtus Blochii, Lacép. ii, pp. 516, 517; Cuv. and Val. ix, p. 421, pl. 277; Cuv. Règne Anim. Poiss. pl. 64, f. 2; Swainson, Fishes, ii, p. 253.

Blennius, ? Russell, Fish. Vizag. i, p. 37, and *Somdrum-kara-mooddee*, pl. 48.

Kurtus cornutus, Cuv. Règ. Anim. Poiss. pl. 64, f. 1; Cuv. and Val. ix, p. 426.

Cyrtus Indicus, Cantor, Catal. p. 145; Kner, Novara Fische, p. 172.

Kakasi, Tel.; *Oordah* and *Valliaul-cutchul*, Tam.

B. vii, D. $\frac{6-7}{13-14}$, P. 21, V. 1/5, A. $\frac{2}{31-33}$, C. 17, Vert. 8/15.

Length of head 1/4 to 2/9, of caudal 1/4 to 2/9, height of body 1/3 to 2/7 of the total length. *Eyes*—in the anterior half of the head, 1 diameter from end of snout, and $1\frac{1}{4}$ apart. Body strongly compressed, the males having a cartilaginous arched process directed forwards and situated a short distance in front of the dorsal fin. Lower jaw the longer, and having a tuberosity at the symphysis, when the mouth is closed its extremity forms a portion of the dorsal profile: the maxilla reaches to below the last third or hind edge of the orbit. A strong, short spine directed downwards at the angle of the preopercle, and two or three more along its lower edge: the occipital ridge rough. *Teeth*—in minute rows, in the jaws, vomer, and palatines. *Fins*—dorsal fin having five spines in front of its soft portion, preceded by a recumbent spine directed anteriorly: in front of this spine are some points appearing above the skin, most distinct in the fry, and similar to the rudimentary fins of *Stromateidæ*, &c.: soft portion of the dorsal fin highest anteriorly: ventral reaches as far as the anal, it has a short backwardly-directed spine in front of the base of the outer ray of either fin, and also a horizontally similar but larger one between the two fins. Second anal spine two-thirds as high as the rays: the length of the first few anal rays equals four-ninths that of the fins base: caudal deeply lobed. *Scales*—fine and irregular on the body.

Lateral-line—ceases opposite the end of the soft dorsal. *Colours*—silvery shot with steel-blue, or lilac: back with fine black dots which behind the occiput form a rounded black spot.

The young are not uncommon in the Sunderbunds about January and February.

Habitat.—Seas of India to the Malay Archipelago and beyond. It attains at least $4\frac{1}{2}$ inches in length, and is most numerous on the Coromandel coast during the cold months. The specimen figured is a male from Coconada.

Genus, 2—Pempheris, *Cuv. and Val.*

Branchiostegals seven. Body oblong, compressed: head obtuse. Eyes large. Cleft of mouth oblique, with the lower jaw prominent. Opercle with a small spine. Villiform teeth on the jaws, vomer, and palatine bones. A single short dorsal fin with six spines and nine rays: anal with three spines and many rays. Scales small, extended over the anal fin. Air-vessel divided into an anterior and posterior portion. Pyloric appendages few.

Geographical distribution.—Red Sea, seas of India, to the Malay Archipelago and beyond.

SYNOPSIS OF SPECIES.

1. *Pempheris mangula*, D. $\frac{6}{9}$, A. $\frac{3}{42-46}$, L. l. 60-64. Eyes, diameter $2\frac{1}{4}$ to $2\frac{1}{2}$ in length of head: height of body $3\frac{1}{3}$ in the total. Silvery, dorsal black tipped. Seas of India to the Malay Archipelago and beyond.

2. *Pempheris Molucca*, D. $\frac{6}{9}$, A. $\frac{3}{40-42}$, L. l. 56. Eyes, diameter half the length of head: height of body 2,5 of the total. Silvery, fins stained with darker. Red Sea, seas of India to the Malay Archipelago.

1. **Pempheris mangula,** Plate XLII, fig. 3.

Sparus mangula-kutti, Russell, Fish. Vizag. ii, p. 10, pl. 114.

Pempheris mangula, Cuv. and Val. vii, p. 304; Bleek. Chætod. p. 30; Günther, Catal. ii, p. 509; Kner, Novara Fische, p. 171; Klunz. Verh. z. b. Ges. Wien, 1871, p. 469; Garrett, F. d. Sudsee, t. lix, f. B.

Pempheris Otaitensis, Cuv. and Val. vii, p. 304, pl. 191; Less. Voy. Coc. p. 197; Günther, Catal. ii, p. 508; Kner, Novara Fische, p. 171.

? Pempheris Vanicolensis et *nesogallica*, Cuv. and Val. vii, pp. 305, 306.

B. vii, D. $\frac{6}{9}$, P. 17, V. 1/5, A. $\frac{3}{42-46}$, C. 17, L. l. 60-64.

Length of head 1/5, of caudal 1/5, height of body 3/10 of the total length. *Eyes*—diameter from $2\frac{1}{4}$ to $2\frac{1}{2}$ in the length of head. Interorbital space slightly concave. The maxilla reaches to below the middle of the eye. Preopercle having rather a strong denticulation on its intramarginal edge near the angle. *Teeth*—villiform in jaws, vomer, and palate. *Fins*—soft dorsal highest anteriorly, rapidly decreasing in height to the last ray. Pectoral a little longer than the head. Ventral reaches the anal fin. Anterior portion of the anal the highest and equal to two-fifths of that of the body: caudal emarginate. *Colours*—violet-brown superiorly, becoming silvery below. Fins roseate with fine dots: axilla and base of pectoral light coloured.

Habitat.—Seas of India and beyond. The specimen figured (6 inches long) is from Madras, where at times it is abundant.. Jerdon, M. J. L. and Sc. 1851, p. 134, observes this fish is termed *Moonda-kun-karawa*, Tamil.

2. **Pempheris Molucca,** Plate XLII, fig. 2.

Pempheris Molucca, Cuv. and Val. vii, p. 306; Cuv. Règ. Anim. Ill. Poiss. pl. 44, f. 2; Temm. and Schleg. Fauna Japon, p. 85, pl. 44, fig. 3; Richards. Ich. China, p. 244; Cantor, Catal. p. 175; Günther, Catal. ii, p. 509; Day, Fishes of Malabar, p. 108.

Pempheris Malabarica, Cuv. and Val. vii, p. 308.

B. vii, D. $\frac{6}{9}$, P. 18, V. 1/5, A. $\frac{3}{40-42}$, C. 17, L. l. 56, Cæc. Pyl. 6-7, Vert. 10/14.

Length of head $3\frac{2}{3}$, of caudal 1/5, height of body 2/5 of the total length. *Eyes*—diameter about 1/2 the length of the head, 3/4 of a diameter apart. The maxilla reaches to below the middle of the orbit. Preopercle entire, but having three somewhat spinate denticulations along its intra-marginal border. *Teeth*—in jaws, vomer, and palate. *Fins*—dorsal spines weak, increasing in length to the last which is scarcely so high as the first rays, the soft portion decreases posteriorly in height. Pectoral as long as the head. Ventral short: anal highest in front: caudal forked. *Scales*—the rows along the lateral-line larger than the others. *Colours*—silvery-grey, upper third of the dorsal rays black: pectorals orange, and usually having a dark base; anal rather dark anteriorly and inferiorly: caudal with its posterior margin stained grey.

It is suggested by Cuv. and Val. that *Curtus macrolepidotus*, Bl. Schn. p. 164, which is said to have large scales with their edges dotted with red, subvertical eyes and B. 2, D. $\frac{7}{10}$, P. 12, V. 1/5, A. $\frac{1}{11}$, C. 22, from Tranquebar, may be this species: the $\frac{1}{11}$ being a misprint for $\frac{1}{41}$. More information is however necessary before this point can be decided.

This species is very abundant off the Sind coast, and found through the seas of India to Japan.

Habitat.—Red Sea, seas of India to the Malay Archipelago and beyond. The specimen figured (6 inches long) is from Kurrachee.

Family, XI—POLYNEMIDÆ.

Branchiostegals seven: pseudobranchiæ. Body oblong, somewhat compressed. Eyes large, lateral, more or less covered by an adipose membrane: mouth on the lower side of a prominent snout, and having a lateral cleft. Muciferous system on the head well developed. Villiform teeth on the jaws, and palatines: present or absent on the vomer. Two dorsal fins: several free and articulated appendages below the pectoral fin: ventrals thoracic, with one spine and five rays. Scales finely ctenoid or cycloid, and more or less covering the vertical fins. Lateral-line continuous, continued on to the caudal fin. Air-vessel, when present, varying in form and structure. Pyloric appendages of varying numbers.

Geographical distribution.—Seas of India to the Pacific, also tropical portions of the Atlantic, not found in the Red Sea.

SYNOPSIS OF INDIVIDUAL GENUS.

Genus, 1—*Polynemus.* Definition as in the Family.

Uses.—These fish are all excellent as food, and from some, rough isinglass or fish-sounds are obtained and exported in large quantities.

Genus, 1—Polynemus,* *Linn.*

Trichidion, Klein; *Polistonemus*, Gill; *Eleutheronema*, Bleeker.

Preopercle serrated. Teeth villiform on the jaws, palatines, vomer, and pterygoid bones. First dorsal fin with seven or eight weak spines; soft dorsal and anal of nearly equal extent: pectoral rays simple or branched and having a varying number of free ones (3-7) *at the base of the fin. Scales ctenoid, rather small, extended on to the vertical fins. Air-vessel, when present, varying in form, size, and structure. Pyloric appendages few, in moderate numbers, or many.*

SYNOPSIS OF SPECIES.

1. *Polynemus paradiseus*, D. 7 | $\frac{1}{15-16}$, A. $\frac{2}{12}$, L. l. 70. Seven free pectoral rays, the three upper being twice as long as the fish. No air-vessel. Golden colour. Upper part of Bay of Bengal to the Malay Archipelago, entering rivers.

2. *Polynemus heptadactylus*, D. 8 | $\frac{1}{12-13}$, A. $\frac{3}{11-12}$, L. l. 50-52. Seven free pectoral rays reaching the base of the anal. No air-vessel. Golden, pectoral black, vertical fins with dark edges.

3. *Polynemus xanthonemus*, D. 8 | $\frac{1}{11}$, A. $\frac{3}{11-12}$. Six free pectoral rays reaching beyond the tip of the ventral. No air-vessel. Fins edged with black. Seas of India to China.

4. *Polynemus sextarius*, D. 8 | $\frac{1}{12-13}$, A. $\frac{3}{12-13}$, L. l. 48-50. Six free pectoral rays reaching to the middle or end of the ventral fin. Air-vessel small and simple. Upper half of dorsal, pectoral, and outer part of ventral black. A large black shoulder-spot. Seas of India to the Malay Archipelago.

5. *Polynemus sexfilis*, D. 8 | $\frac{1}{12-13}$, A. $\frac{3}{11-12}$, L. l. 46. Six free pectoral rays reaching rather beyond the ventrals. Air-vessel large. Golden, pectoral black: dorsal and anal black-edged. Seas of India to the Malay Archipelago.

6. *Polynemus Indicus*, D. 8 | $\frac{1}{13-14}$, A. $\frac{2-3}{11-12}$, L. l. 70-75. Five free pectoral rays reaching nearly to the anal fin. Air-vessel long and narrow. Vertical fins dark edged. Seas of India to Australia.

7. *Polynemus plebeius*, D. 8 | $\frac{1}{13}$, A. $\frac{2-3}{11}$, L. l. 60-65. Five free pectoral rays reaching to the end of the ventral fin. Air-vessel present. Golden, with grey longitudinal bands. Seas of India to China.

8. *Polynemus tetradactylus*, D. 8 | $\frac{1}{13-15}$, A. $\frac{2-3}{15-17}$, L. l. 75-85. Four free pectoral rays reaching to the end of the ventral. Air-vessel absent. Seas of India to the Malay Archipelago and China.

1. Polynemus paradiseus, Plate XLII, fig. 4.

Polynemus paradiseus, Linn. Syst. Nat. p. 1401; Russell, ii, p. 69, pl. 185; Günther, Catal. ii, p. 320.

Polynemus risua, aureus, toposui, Ham. Buch. Fish. Ganges, pp. 228, 232, 381.

Polynemus longifilis, Cuv. and Val. iii, p. 365, and vii, p. 512; Bleeker, Bengal, p. 91, and Enum. Spec. Ind. Arch. p. 245, (not Borneo, ii, p. 268, and vi, p. 418.)

Trichidion paradiseus, Bleeker, Fish. Madagascar, p. 78.

Tupsee muchee, Beng.; *Nga-poongna*, Burm. *Mangoe fish.*

B. vii, D. 7 | $\frac{1}{15-16}$, P. 15+vii, V. 1/5, A. $\frac{2}{12}$, C. 19, L. l. 70, L. tr. 5/14, Vert. 10/15, Cæc. pyl. 5(10).

Length of head 2/13 to 1/6, of pectoral 2/5 to 1/4, of caudal $3\frac{1}{4}$ to $3\frac{1}{2}$, height of body 2/13 to 1/6 of the total length. *Eyes*—minute in the young, in the adult diameter 1/8 of length of head, 2 diameters from end of

* *Kala*, Tam.: *Nut-tiah*, Mugh.

snout, and 3 apart. Height of head equals its length excluding the snout, its width equals its postorbital length. Snout overhanging the mouth. The maxilla extends to upwards of two diameters behind the posterior edge of the orbit. Preopercle serrated and having a soft, produced, and rounded, angle: the other opercles entire. A small spine on the shoulder. *Teeth*—villiform in jaws, vomer, and palate. *Fins*—spines of first dorsal weak, the second one slightly the longest: the height of the first ray of the second dorsal equals the length of the base of the fin which is highest anteriorly, its upper edge concave. Pectoral rays undivided, the fin has seven free rays below its base, the three superior being the longest, strongest, and about twice the length of the fish. Ventral does not quite reach the anal, the latter fin commencing under the second dorsal and being of the same height, its lower edge emarginate. Caudal deeply forked, upper lobe the longer. *Scales*—ctenoid, in regular horizontal rows, covering the body and head, with fine ones over the vertical fins. *Lateral-line*—forms a gradual curve, and becomes lost at the centre of the base of the caudal fin. Least depth of the free portion of the tail equals 2/5 of the length of the head. *Air-vessel*—absent. *Colours*—generally golden, with a shade of gray along the back, and the dorsal fins also stained grayish with a slight tinge of the same shade, so are also the caudal, the pectoral, and upper pectoral appendages.

Buchanan observes: "Those who officiate in the temple of *Sib* are called *Tapasi* in the vulgar dialect, and *Tapasivi* in Sangskritta, that is to say penitents. They ought not to shave, on which account a fish called *Mangoe* fish by the English of Calcutta, which has long fibres proceeding from near its head, is called by the same name."

Habitat.—Indian seas, Bay of Bengal at least as low as Coconada, also along the coasts of Burma to the Malay Archipelago, entering rivers for spawning purposes, and generally during the S. W. monsoon and the cold months. It is considered a great luxury for the table and commences to be taken in numbers about June. It attains 9 inches in length. Ham. Buch. observes: "I have, I think, observed three species included under this name (Mangoe fish), and Dr. Russell describes a fourth: but all have exactly the same qualities and manners, nor am I sure that the slight differences in the number of rays which I observed may not be accidental varieties, rather marking individual than specific differences" (p. 229).

2. **Polynemus heptadactylus**, Plate XLII, fig. 5.

Cuv. and Val. iii, p. 390; Bleeker, Perc. p. 60; Cantor, Catal. p. 34; Günther, Catal. ii, p. 321; Day, Fishes of Malabar, p. 59.

B. vii, D. 8 | $\frac{1}{12-13}$, P. 15+vii, V. 1/5, A. $\frac{3}{11-12}$, C. 19, L. l. 50-52, L. tr. 5/11, Cæc. pyl. 4.

Length of head 1/5, of caudal 1/4, height of body 1/4 of the total length. *Eyes*—diameter $3\frac{3}{4}$ in the length of head, 1/2 a diameter from end of snout, and 1 apart. Height of the head equals its length excluding the snout, the width of the head nearly equals half its length. The maxilla reaches to 1/2 a diameter behind the posterior edge of the eye: interorbital space nearly flat. Preopercle strongly serrated, having a well developed spine just above its angle, which is rounded and produced. A spine on shoulder at the commencement of the lateral-line. *Teeth*—villiform in jaws, vomer, and palate. *Fins*—first dorsal spine short, the third the longest and equal to 2/3 the height of the body, the last scarcely one-third of its height; second dorsal highest anteriorly where it equals 3/4 of that of the body, upper edge of the fin concave. Pectoral rays unbranched, the length of the fin equals 3/4 of the height of the body, its appendages reach to the base of the anal, the upper being the longest. Ventral reaches the vent. Anal highest anteriorly where it equals the first dorsal, its lower edge straight. Caudal deeply lobed. *Air-vessel*—absent. Free portion of the tail in its least depth equals $1\frac{2}{3}$ in the length of the head. *Colours*—golden, pectoral nearly black: edge of first dorsal, upper edge of second dorsal, margins of caudal, lower half of the anal and tip of ventral also black.

Habitat.—Seas of India to the Malay Archipelago, attaining at least 6 inches in length.

3. **Polynemus xanthonemus.**

Cuv. and Val. vii, p. 517; Richardson, Ich. China, p. 219; Günther, Catal. ii, p. 325.

B. vii, D. 8 | $\frac{1}{11}$, P. 15+vi, A. $\frac{3}{11-12}$, Cæc. pyl. 12.

It is observed that this fish more resembles *P. sextarius* than *P. sexfilis*. *Fins*—its six free pectoral rays extend beyond the end of the ventral but are shorter than in *P. hexanemus*, in which they reach to the end of the body. Although the caudal lobes are not more elongated than in *P. sextarius* (1/5 of the total length), the fin is more deeply cleft. *Air-vessel*—absent. *Colours*—back greenish, sides and abdomen silvery: the fins yellow with a black border, the free rays are the same colour as the fins.

Sir John Richardson observes of Reeves' figure, that it "has a zigzag blackish line above the base of the pectoral, which is not noticed in the 'Histoire des Poissons,' but in other respects it agrees with the description in that work."

Habitat.—Seas of India to China, attaining at least 6 inches in length. I have not recognised this species in India.

4. **Polynemus sextarius**, Plate XLII, fig. 6.

Bloch. Schn. p. 18, t. iv; Cuv. and Val. iii, p. 388, and vii, p. 514; Bleeker, Perc. p. 59; Cantor, Catal. p. 32; Günther, Catal. ii, p. 326; Day, Fish. Malabar, p. 60.

B. vii, D. 8 | $\frac{1}{12-13}$, P. 14 + vi, V. 1/5, A. $\frac{3}{12-13}$, C. 17, L. l. 48-50, L. tr. 5/10.

Length of head 1/4 to $4\frac{1}{4}$, of caudal 1/5 to 2/9, height of body 1/4 to 2/9 of the total length. *Eyes*—diameter 1/3 to $3\frac{3}{4}$ in the length of head, 2/5 to 3/4 of a diameter from end of snout, and about 1 apart. Height of head equals its length behind the middle of the eye, its width from $2\frac{1}{4}$ to $2\frac{1}{2}$ in its length. The maxilla reaches to behind the posterior edge of the orbit. Vertical margin of preopercle denticulated, with a rather strong tooth just above its angle, which latter is rounded, produced, and entire. *Teeth*—villiform, those on the vomer in a transverse band, whilst the palatine band is semi-interrupted. *Fins*—dorsal spines with rather filamentous terminations, the third being equal to $1\frac{1}{3}$ in the height of the body and as long as the highest ray in the second dorsal: the height of the second dorsal and of the anal are nearly the same, but the length of the base of the former is longer than that of the latter: upper edge of the second dorsal fin scarcely, if at all, emarginate. Pectoral rays branched; the free rays at the base of the fin reach to the middle of the ventral fin, occasionally to its end: caudal rather deeply forked. A spine on the shoulder at the commencement of the lateral-line. *Air-vessel*—small and simple. *Cæcal appendages*—long and rather numerous. Free portion of the tail in its lowest part equal to 1/2 the length of the head. *Colours*—golden, the upper half of the first dorsal black spotted: pectoral and ventral with numerous black spots sometimes occasioning the former to be almost black: other fins more or less numerously dotted with black and often black-edged. A large black spot on the shoulder on the lateral-line from the second to the eighth scales.

This fish is very numerous throughout the coasts of India up to $7\frac{1}{2}$ inches in length.

Habitat.—East coast of Africa, seas of India to the Malay Archipelago.

Jerdon in his Ichthy. paper on Madras (M. J. L. and Sc. 1851, p. 140) observes of the species of this genus he had obtained "*Polynemus tetradactylus*, C.V. *Yerra kala*, Tam.; *P. plebeius*, C.V. *Pole kala*, Tam.; *P. Indicus*, Shaw, *Walan kala*; *P. sextarius*, C.V. *Kutli kala*, Tam.; *P. heptadactylus*, C.V. *Ma-kala*, Tam. The first three species are called Roeball at Madras and are considered good eating."

5. Polynemus sexfilis, Plate XLIII, fig. 1.

? Cuv. and Val. vii, p. 515; Günther, Catal. ii, p. 325 (not Playfair, Fish. Zanz.* p. 53).
Polynemus hexanemus, Cantor, Catal. p. 33 (not Cuv. and Val.).
Trichidion sexfilis, Bleeker, Fish. Madagascar, p. 79.

B. vii, D. 8 | $\frac{1}{12-13}$, P. 15 + vi, V. 1/5, A. $\frac{3}{11-12}$, C. 17, L. l. 46, L. tr. 5/10, Cæc. pyl. many.

Length of head $4\frac{1}{4}$, of caudal 2/7, height of body 2/9 of the total length. *Eyes*—diameter 2/9 of length of head, 1/2 a diameter from end of snout, and 1 apart. Height of head equals its length excluding the snout, its width equals 4/7 of its length. The maxilla reaches half a diameter behind the orbit. Vertical margin of preopercle strongly denticulated with a rather strong tooth above its rounded, produced, but entire angle. *Teeth*—villiform in jaws, in a semilunar band on the vomer, and in an interrupted one on the palatines. *Fins*—third dorsal spine 2/3 of the height of the body: second dorsal 1/4 higher anteriorly than the anal, its upper edge rather concave. The pectoral rays unbranched, the free ones reach to rather beyond the end of the ventral: base of the anal slightly longer than that of the second dorsal: caudal deeply forked. A spine on the shoulder at the commencement of the lateral-line. Free portion of the tail as high as it is long, its least height equal to nearly 1/2 the length of the head. *Cæcal appendages*—long and rather numerous. *Air-vessel*—large. *Colours*—golden, pectoral deep black, a black lower edge to the anal: ventral dark in the middle.

In Cuv. and Val. *P. sexfilis* is said to have no air-vessel. This species appears to closely resemble *P. Pfeifferæ*, Bleeker, which also has a large air-vessel, and D. 8 | $\frac{1}{11}$, A. $\frac{3}{11}$, L. l. 48. Length of head 1/5, and of caudal lobes $3\frac{1}{4}$ in the total length.

This species differs from *P. sextarius* in its eye being smaller, its caudal lobes larger, the base of its anal longer than that of its second dorsal, its third dorsal spine 2/3 of the height of the body, some of its pectoral free-rays reaching beyond the end of the ventral, and its rays being simple, and likewise in having a black pectoral fin but no black shoulder-spot. From the *P. xanthonemus*, wherein only 12 pyloric appendages exist.

Cantor, whilst observing that "the second, third, and fourth filaments from the pectoral fin are the

* The fish alluded to by Colonel Playfair in the "Fishes of Zanzibar," is not identical with the above, and might be termed *Polynemus Playfairi*, if it is not *P. kuru*: two other specimens exist in the British Museum: the species is as follows:—

B. vii, D. 8 | $\frac{1}{14}$, P. 13 + vi, V. 1/5, A. $\frac{3}{12}$, C. 17, L. l. 63, L. tr. 7/13.

Length of head $5\frac{1}{4}$, of caudal $3\frac{3}{4}$, height of body $4\frac{3}{4}$ of the total length. *Eyes*—diameter nearly 1/3 of length of head, 1/4 of a diameter from end of snout, and 1 apart. The maxilla reaches to a little behind the vertical from the posterior edge of the orbit. Height of head equals its length excluding the snout, its width two-thirds of its length. A spine at the shoulder. *Fins*—first dorsal two-thirds as high as the body below it: second dorsal nearly equal in height to the length of the head and having its upper edge deeply concave, its front rays being one-fifth higher than the first dorsal fin. Pectoral as long as the head behind the middle of the eye, its upper free-rays reach to a little beyond the end of the fin. The distance between the bases of the ventral and anal fins equals the length of the head excluding the snout. Anal not quite so high as the second dorsal, it commences below the fifth dorsal ray and has a very emarginate lower edge. Caudal deeply forked. Free portion of tail slightly higher at its base than it is long. *Colours*—body with lines along each row of scales and a black pectoral fin.

This species appears to be closely allied to *P. kuru*, Bleeker, which however has the upper caudal lobe $3\frac{1}{3}$ in the total length. The specimen (Col. Playfair's) from which this description has been taken is about 14 inches in length.

Habitat.—East coast of Africa to the Malay Archipelago, and probably found in the seas of India, although I have not obtained it there. It would be interesting to see if it has or has not an air-vessel.

longest, greatly exceeding the length of the head almost extending to the anal fin," (p. 33), considers his fish identical with *P. hexanemus*, wherein some of them reach the *caudal fin*.

Habitat.—Seas of India and Mauritius. The specimen, which is figured life-size, is from Madras.

6. Polynemus Indicus.

Polynemus maga-booshee, Russell, ii, p. 68, pl. 184.

Polynemus Indicus, Shaw, Zool. v, p. 155; Swainson, Fishes, ii, p. 234; McClell. Cal. J. N. H. iii, p. 179,* pl. vi; Cantor, Catal. p. 29; Günther, Catal. ii, p. 326; Day, Fishes of Malabar, p. 60; Kner,† Novara Fische, p. 137.

Polynemus sele, Ham. Buch. Fish. Ganges, pp. 226, 381; McClelland, Cal. Journ. Nat. Hist. iii, p. 181.

Polynemus uronemus, Cuv. and Val. iii, p. 385.

Polynemus plebeius and *gelatinosus*, McClelland, C. J. N. H. iii, pp. 179, 181.

Tahlun-kala, Tam.: *Yeta*, Mal.: *Dara*, Bombay: *Bhãt*. Mahr.: *Lukwah*, Arrac.: *Katha* or *Ka-ku-yan*, Burm.: *Kwey-yeng*, Tavoy.

B. vii, D. 8 | $\frac{1}{13-14}$, P. 15 + v, V. 1/5, A. $\frac{2-3}{11-12}$, C. 17, L. l. 70-75, L. tr. 7/13, Vert. 5/19, Cæc. pyl. many.

Length of head $4\frac{1}{4}$ to $4\frac{1}{2}$, of pectoral 1/6 to 2/13, of caudal 1/4, height of body 1/6 of the total length excluding the filamentous prolongation of the tail. *Eyes*—diameter 1/7 of length of head, 1 to $1\frac{1}{4}$ diameters from end of snout, and 2 apart. Height of head equals 2/3, and its width 2/5 of its length. The maxilla reaches to far behind the orbit. Preopercle with a rounded and produced angle, its posterior margin moderately serrated, and having a strong tooth above its angle. Interorbital space rather flat. *Teeth*—villiform in the jaws, in a somewhat semilunar band on the vomer, and in a wide cuneiform band broadest anteriorly on the palatines, the last being emarginate internally about its centre. *Fins*—spines of first dorsal weak, the third having rather a filamentous prolongation, the fin one-third higher than long, second dorsal highest in front where it equals the anal and is one-third higher than its base is long: upper edge of the fin concave. Pectoral with its rays branched, having five articulated free rays, the upper of which is the longest reaching nearly to the anal, which latter fin extends posteriorly some distance behind the vertical from the end of the second dorsal, its lower edge is concave. The distance between the bases of the ventral and anal fins is longer than the head. Caudal deeply lunated having pointed lobes which usually have filamentous terminations, the lower being mostly the longer. Free portion of the tail in its least depth equal to 2/5 of the length of the head. *Air-vessel*—oval and thick, occupying the entire length of the abdomen and posteriorly prolonged amongst the caudal muscles. It adheres to the vertebræ from the third to the seventh, whilst from either side towards the ventral surface it has from 28 to 35 appendages. *Lateral-line*—continued along the lower caudal lobe almost to its end. Vertical fins rather densely scaled. *Colours*—back purplish-black, abdomen silvery-white, dashed with gold. First and second dorsals also anal stained with black, as is likewise the lower half of the opercle. Caudal with many black points.

Habitat.—Seas of India to the Malay Archipelago and Australia. It attains 4 feet in length, but is rarely above 20lbs weight. A large fish yields about two ounces of rough isinglass. The largest specimens appear to be captured in the embouchures of large rivers: they take a bait freely.

7. Polynemus plebeius

Brouss. Ich. fasc. i, t. viii; Gmel. Linn. p. 1401; Bloch. t. cccc; Bl. Schn. p. 17; Shaw, Zool. v, pl. cxxv; Cuv. and Val. iii, p. 380; Temm. and Schleg. Fauna Japon, p. 29, t. xi, fig. 1; Bleeker, Perc. p. 58; Richards. An. and Mag. Nat. Hist. 1842, p. 210; McClell. Cal. Journ. Nat. Hist. iii, p. 185; Cantor, Catal. p. 27; Günther, Catal. ii, p. 329.

Polynemus lineatus, Lacép. v. pl. 13, f. 2, p. 410; Günther, Catal. ii, p. 327; Kner, Novara Fische, p. 137.

Polynemus tæniatus, Günther, Catal. ii, p. 526.

Trichidion plebejus, Bleeker, Fish. Madagascar, p. 79.

B. vii, D. 8 | $\frac{1}{13}$, P. 17 + v, V. 1/5, A. $\frac{2-3}{11}$, C. 17, L. l. 60-65, L. tr. 7-8/13, Cæc. pyl. many.

Length of head 2/9, of caudal 3/11, height of body 1/5 of the total length. *Eyes*—diameter $3\frac{3}{4}$ to $4\frac{1}{3}$ in the length of head, 1/2 to 3/4 of a diameter from end of snout, and 1 to $1\frac{1}{4}$ apart. Interorbital space rather convex. Height of the head equals its length excluding the snout, its width is not 1/2 its length. The maxilla reaches to about 1 diameter behind the posterior edge of the eye. Angle of preopercle rounded and produced; its vertical limb rather coarsely serrated and most so above the angle. *Teeth*—villiform. *Fins*—third dorsal spine with rather a filamentous prolongation and equal to 3/4 of the height of the body, the length of the base of the fin equals rather above 2/3 of its height. Second dorsal rather higher anteriorly than the first or than the anal, its upper edge deeply concave. Pectoral rays unbranched, its length equals 3/4 the height of the body, of its five free-rays the superior reaches rather beyond the ventral. Ventral reaches the vent, the distance between its

* McClelland observes (C. J. N. H. iii, p. 173) that "at Scinde (where it proves, as originally suggested by us, to be the source of the cod-sounds alluded to as an article of export from Kurrachee) it is called *seer*." However the Kurrachee fish is a *Sciænoid* (see p. 187) and not one of this family. See also paper by Mr. O. Reilly, l. c. ii, p. 450, and by Captain Bogle, ii, p. 615.

† Kner observes of Russell's figure "*nicht gut*." Cantor however more justly remarks that it was in his time "the only correct figure."

base and that of the anal equals the length of the head excluding the snout. First spine of anal minute or wanting: the lower edge of the fin deeply concave. Caudal with pointed lobes. Least depth of the free portion of the tail equals half the length of the head. *Air-vessel*—elongated, narrow, and simple. *Cæcal appendages*—numerous. Vertical fins rather densely scaled. *Lateral-line*—continued along the lower lobe of the caudal fin to the end of its second or third rays below its centre. *Colours*—golden, having a grayish tinge along the back and darkish lines along each row of scales: anal fin dashed with gray, ventral white and externally grayish: both dorsals, the caudal and pectoral gray-edged.

Habitat.—This species is exceedingly common in the seas and estuaries of India. I have captured females full of roe as early as March. It is found from Sind through the seas of India to the Malay Archipelago and beyond.

8. Polynemus tetradactylus.

Polynemus maga-jellee, Russell, Fish. Vizag. ii, p. 68, pl. 183.

Polynemus tetradactylus, Shaw, Zool. v, p. 155; Cuv. Règ. Anim. Ill. Poiss. pl. xix, f. 1; Cuv. and Val. iii, p. 375, vii, p. 514; Swainson, Fishes, ii. p. 234; McClell. Journ. As. Soc. Beng. 1839, p. 206; Royle on Isinglass, pp. 25, 26: Richards. Ich. China, p. 218; Bleeker, Perc. p. 57; Cantor, Catal. p. 25; Günther, Catal. ii, p. 328; Day, Fish. Malabar, p. 62; Kner, Novara Fische, p. 138.

Polynemus teria, Ham. Buch. Fish. Ganges, pp. 224, 381; Gray and Hard. Ill. Ind. Zool. pl. 92, f. 2.

Polynemus salliah et *quadrifilis*, Cantor, Journ. Roy. As. Soc. v, p. 166.

Eleutheronema tetradactylus, Bleeker, Bintang, 1868, p. 5.

Polun-kala, Tam.: *To-bro-dah*, Andam.

B. vii, D. 8 | $\frac{1}{13-15}$, P. 17+iv, V. 1/5, A. $\frac{2-3}{15-17}$, C. 17, L. l. 75-85, L. tr. 8/14, Cæc. pyl. many.

Length of head 1/5, of caudal 1/5, height of body 1/5 to 1/6 of the total length. *Eyes*—diameter 2/9 to 1/5 of the length of head, 1/2 a diameter from end of snout, and 1 apart. Height of head equals its length excluding the snout or behind the middle of the eye, its width equals 2/5 of its length. The maxilla extends to 1 diameter behind the posterior edge of the orbit. Angle of preopercle produced and rounded, its vertical limb serrated and having its strongest denticulation just above the angle. *Teeth*—villiform. *Fins*—third dorsal spine equals 3/4 of the height of the body and is as long as the anterior rays of the second dorsal, the upper edge of which last fin is concave. Pectoral rays undivided, the free rays reach nearly to the end of the ventral, which latter extends to the vent. The distance between the bases of the ventral and anal fins equals the length of the head excluding the snout. Anal similar to second dorsal, its first spine minute or absent:* caudal deeply forked. *Air-vessel*—absent. *Cæcal appendages*—numerous. The least depth of the free portion of the tail equals nearly 1/2 the length of the head. *Colours*—silvery-green, becoming yellowish-white on the sides and abdomen: dorsal and caudal grayish with minute black points and nearly black at the edges: ventral and anal pale orange in their outer halves, pectoral filaments white. A dark mark on the upper portion of the opercle.

Habitat.—Seas of India to the Malay Archipelago and China, attaining 6 feet and upwards in length: it is excellent eating. This species appears to ascend higher up the rivers than any of the others, and the young are numerous in the Hooghly at Calcutta. Ham. Buchanan observes: "I have been assured by a credible native that he saw one which was a load for six men, and which certainly therefore exceeded in weight 320 lb. avoirdupois." (Fish. Ganges, p. 225.)

* Cantor gives three or four anal spines: Buchanan two: Russell and Cuvier one. I have specimens in which I can only discover two, others wherein three are distinct.

FAMILY, XII—SCIÆNIDÆ, *Cuv.*

Branchiostegals seven: pseudobranchiæ sometimes concealed, or even absent. Body somewhat compressed and rather elongate. Eyes lateral, of moderate or small size. Mouth in front of or below the snout. Cheeks unarmed; opercles sometimes with weak spines. Barbels present in a few genera. Muciferous system on the head well developed. Teeth in villiform bands, with the outer or inner row often enlarged: canines present in some genera but neither cutting nor molar-form ones in the jaws: palate edentulous. Two dorsal fins, the spines of the first usually feeble (8-12), the second much more developed (22-43 rays) than the first: anal with one or two spines and much fewer (5-16) rays than the second dorsal: pectoral rays branched: ventrals thoracic with one spine and five rays. Scales ctenoid or cycloid, covering the head and snout, placed in oblique and often sinuous rows on the body. Lateral line complete, often continued on to the caudal fin. Stomach cæcal. Air-vessel, when present, as a rule with branching or elongated appendages. Pyloric appendages generally few.

The number of rays in the soft dorsal fin are liable to considerable variation in species belonging to this family, whilst the caudal becomes more obtuse as the adult stage is arrived at. The scales, which are placed in oblique rows, often vary considerably in the number of pierced ones along the lateral-line, and in those descending or ascending to it, consequently it becomes necessary to enumerate what are present in each separate place. The eye is comparatively very much smaller in adults of this family than it is in the immature.

Bleeker, Mémoire sur les Sciénoides (1874), has shown that the dentition of these fishes forms a far better guide to classification than the size and length of the second anal spine, &c. He also questions the utility of separating *Sciæna* (Artedi) Bleeker=*Umbrina*, Cuv. and Val. from *Johnius* (Bloch) Bleeker, simply because the former has a central barbel under the symphysis of the lower jaw. In my investigations I have found another species, *Sciæna albida*, C. V. (or a *Pseudosciæna*, Bleeker), in which a rudimentary barbel exists at each of the first lateral open pores below the symphysis of the lower jaw, but obviously insufficient for the purpose of constituting a new genus.

Uses.—The air-vessels of many of these fishes are extensively collected along the coasts of India as they afford isinglass which is exported to China and elsewhere. As food however their flesh is rather tasteless whilst young, and coarse when large, consequently in many localities, as Kurrachee or in Beloochistan, the sounds or air-vessels are as valuable as the whole of the remainder of the fish.

Habitat.—Klünzinger observes that from the Red Sea no representatives of the true SCIÆNIDÆ have been recorded; a few appear to be present along the East coast of Africa, whilst from Beloochistan and Sind throughout the seas of India they are numerous, many entering estuaries and rivers, and although one species (*S. coitor*) is often found far above tidal reach it still is only a visitor from the ocean.

SYNOPSIS OF GENERA.

1. *Umbrina.* Upper jaw overlapping the lower. A central barbel under the symphysis of the lower jaw. Fins as in *Sciæna.*

2. *Sciæna.* Upper jaw overlapping the lower or both equal. Teeth villiform, with an outer enlarged row in the premaxillaries and sometimes an inner enlarged series in the mandibles. No central barbel beneath the chin; second dorsal fin rather long (23-32 rays).

3. *Sciænoides.* Eyes small: head broad and convex. Upper jaw overlapping the lower or both equal. Teeth villiform, with an outer much enlarged row in the premaxillaries, and an inner conical series in the mandibles. No barbels. Second dorsal fin elongated (27-43 rays).

4. *Otolithus.* Lower jaw prominent. Elongated and pointed canines in both jaws: a single row of widely separated conical teeth in the lower jaw. No barbels. Second dorsal fin rather long (28-31 rays).

Genus, 1—UMBRINA, *Cuv.*

Menticirrhus and *Cirrimens*, Gill: *Sciæna* (Artedi) Bleeker, 1874.

Branchiostegals seven: pseudobranchiæ. Body oblong and rather elongated. Eyes of moderate size. Interorbital space rather broad and somewhat convex. Snout rounded and overhanging the upper jaw, which latter is longer than the lower. A central barbel present below the symphysis of the lower jaw. Teeth villiform, with the outer row in the premaxillaries enlarged: no canines. Two dorsal fins, the first with 9-10 spines and connected at its base to the second which is of moderate length (24-30 rays): anal with two spines. Scales ctenoid or cycloid, extending over the head and snout, and more or less present on the vertical fins, and on that of the tail. Air-vessel present. Pyloric appendages in moderate numbers or few.

The open pores or orifices of some of the muciferous channels of the head are very distinct. There are 3 or 5 in a transverse row across the snout, whilst along the free edge of the skin as it crosses from one preorbital to

* Absent in some American species.

the other over the groove for the posterior limb of the premaxillaries, there are five more. The central one is mostly triangular, the largest, and at the upper surface: whilst along its free edge, sometimes below it, are two more on either side. The existence of a lateral-lobe is entirely due to these orifices, and its size is in accordance with their position.

On the lower surface of the mandible beneath the symphysis is a single central barbel having a pore at its base, occasionally it has one in front and another behind it. On either side of its base laterally and rather posteriorly are two more open orifices.

Habitat.—From the East coast of Africa, through the seas of India to the Malay Archipelago and beyond. They are found in the Mediterranean and Atlantic, and some in the rivers of North and South America.

SYNOPSIS OF SPECIES.

1. *Umbrina macroptera*, D. 10 | $\frac{1}{28-30}$, A. $\frac{2}{7}$, L. l. 48, Cæc. pyl. 11. Barbel half as long as the eye. First dorsal fin 2/5 the height of body. Scales cycloid on head and chest, elsewhere ctenoid. Grayish. Seas of India to the Malay Archipelago.

2. *Umbrina sinuata*, D. 10 | $\frac{1}{27-29}$, A. $\frac{2}{7}$. L. l. 44. Barbel one-quarter as long as the eye. First dorsal fin 1/2 height of body. Scales ctenoid except on snout, and below eyes. Dorsal, ventral, and anal fins nearly black; nine wide and sinuous brown bands from the back pass downwards and forwards. Sind.

3. *Umbrina Dussumieri*, D. 10 | $\frac{1-2}{24-27}$, A. $\frac{2}{7}$, L. l. 52. Barbel half as long as eye. First dorsal fin from 4/5 to as high as body. Scales cycloid. Usually dark coloured. Seas of India to China.

4. *Umbrina Russellii*, D. 10 | $\frac{1}{24-27}$, A. $\frac{2}{7}$, L. l. 44. Barbel sometimes nearly as long as the eye. First dorsal fin 4/9 of height of body. Scales ctenoid. Grayish, first dorsal tinged with black. Seas of India to the Malay Archipelago.

1. Umbrina macroptera.

Bleeker, Sumatra, p. 254; Günther, Catal. ii., p. 279.

Sciæna macropterus, Bleeker, Mém. Scién. 1874, p. 60.

B. vii, D. 10 | $\frac{1}{28-30}$, P. 17, V. 1/5, A. $\frac{2}{7}$, C. 17, L. l. $\frac{50}{\frac{48}{45}}$, L. tr. 5-6/15, Cæc. pyl. 11.

Length of head 1/4 to 2/9, of caudal 1/6, height of body $3\frac{1}{4}$ to $4\frac{1}{3}$ in the total length. *Eyes*—diameter $3\frac{3}{4}$ to $4\frac{1}{2}$ in the length of head, $1\frac{1}{4}$ to $1\frac{1}{2}$ diameters from the end of snout, and 1 apart. Greatest width of the head equals half its length, and its height equals its length excluding the snout. The snout rather inflated and prominent. Cleft of mouth slightly oblique, the maxilla reaching to below the middle of the eye. The distance between the eye and the maxilla equals 1 diameter of the orbit. Preopercle serrated, most coarsely so at its angle: two opercular points. Three pores across the base of snout: outer fold of skin of snout laterally lobed, having five pores along its free border. Barbel below the symphysis of the lower jaw nearly half the diameter of the eye in length, having a deep pore on either side of its base and another rather more externally. *Teeth*—in villiform rows in both jaws, the outer row in the front half of the premaxillaries being somewhat enlarged. *Fins*—dorsal spines weak, the first very short, the second to the fourth about the same length and equal to 2/5 the height of the body and more than twice as high as the rays. Pectoral as long as the head excluding the snout. Ventral reaches nearly half way to the anal fin. Second anal spine of moderate strength, one-third shorter than the first ray, and equal to $2\frac{1}{4}$ in the height of the body. Caudal rather wedge-shaped. *Scales*—cycloid on the head, chest, and as high as the base of the pectoral fin, the remainder ctenoid. *Lateral-line*—becomes straight opposite the posterior end of the anal fin: the tubes give off a branch on either side which rarely subdivides. *Colours*—grayish, becoming silvery on the abdomen, and everywhere covered with minute black dots, but so small as not to interfere with the general light colour. Fins yellowish, dotted as the body. A dark mark on the opercle.

Habitat.—Seas of India to the Malay Archipelago. I took a female, 8 inches long, with fully developed ova in April, 1868, and found eleven cæcal appendages. It is not uncommon at Madras.

2. Umbrina sinuata, Plate XLVI, fig. 1.

B. vii, D. 10 | $\frac{1}{27-29}$, P. 17, V. 1/5, A. $\frac{2}{7}$, C. 17, L. l. $\frac{50}{\frac{44}{46}}$, L. tr. 7/12.

Length of head $4\frac{1}{2}$, of caudal 1/5, height of body $3\frac{2}{3}$ in the total length. *Eyes*—diameter $3\frac{1}{3}$ in length of head, 3/4 of a diameter from end of snout, and 1 apart. Greatest width of head equals 1/2 its length, and its height equals its length excluding the snout. The distance between the eye and the upper jaw equals 3/4 of the diameter of the orbit. Snout obtuse, swollen, and overhanging the jaws. Upper jaw overlapping the lower: the maxilla reaching to below the middle of the eye. Preopercle serrated, most coarsely at its angle: two opercular spines. Shoulder-flap serrated. Three pores in a transverse line across the base of the snout, and five more orifices along the free edge of the skin, a lateral lobe present on either side. Central barbel below the symphysis of the lower jaw 1/4 the length of the orbit: two open pores on either side. *Teeth*—villiform in both jaws, an outer enlarged row in the anterior half of the premaxillaries, whilst a few of those in the front row of the lower jaw near the symphysis are larger than those posterior to them. *Fins*—dorsal spines weak, the third to the fifth the longest, 1/4 higher than the rays and equal to the length of the head behind the middle of the eyes. Pectoral as long as the head behind the anterior third of the eyes. Ventral reaches two-thirds of the distance to the base of the anal. Second anal spine strong, equal to half the length of the head and 1/3 shorter than the first ray; the length of the base of the fin equals 1/4 of that of the soft dorsal. Caudal

wedge-shaped. *Scales*—ctenoid except on the snout and below the eyes, those on the summit of the head as far as the occiput very much smaller than those on the body. A dense band at basal third of soft dorsal and anal fins. *Lateral-line*—becomes straight above the end of the anal fin, its tubes with two, sometimes more, branches. *Colours*—brownish silvery, everywhere covered with minute dark points. A diffused bluish spot on the opercle. Nine sinuous brown bands on the body, wider than the ground-colour, passing from the back downwards and forwards: a dark spot in the axilla. First dorsal black, a black band along the whole length of the soft dorsal. Anal similar to soft dorsal. Ventral black. Caudal yellow, with a black tip and white outer edge.

Two specimens captured at Kurrachee up to 4 inches in length.

The dorsal fins show considerable similarity to *U. Dussumieri*, but the scales are ctenoid instead of cycloid.

3. **Umbrina Dussumieri**, Plate XLIII, fig. 2 and 3.

Umbrina Dussumieri, Cuv. and Val. ix, p. 481; Bleeker, Sciæn. p. 19; Günther, Catal. ii, p. 279; Day, Fishes of Malabar, p. 48.

Umbrina amblycephalus, Bleeker, Amb. p. 412; Günther, Catal. ii, p. 278.

Seiœna Dussumieri, Bleeker, Mémoire Sciénoid. p. 56.

Taru kattelee, Tam.

B. vii, D. 10 | $\frac{1-2}{24-27}$, P. 17, V. 1/5, A. $\frac{2}{7-8}$, C. 17, L l. $^{58-64}\frac{5\ 2}{5\ 5}$, L. tr. 6/17, Cæc. pyl. 7-9.

Length of head 1/4 to $4\frac{1}{4}$, of caudal 1/7, height of body $4\frac{1}{4}$ to 2/9 of the total length. *Eyes*—diameter 2/7 to $3\frac{3}{4}$ in the length of head, $1\frac{1}{4}$ diameters apart and also from the end of snout. Height of head equals its length excluding the snout, and its thickness equals 2/3 of its length. Dorsal profile more convex than that of the abdomen. Snout obtuse, it and the cheeks inflated: cleft of mouth nearly horizontal: the maxilla reaches to below the middle of the eye. Distance between the eye and the upper maxillary bone equals one diameter of the orbit. Preopercle crenulated (scarcely denticulated) in its whole extent, its angle rounded: two opercular spines. Shoulder-lobe with smooth edges. Central barbel below the chin about half a diameter of the eye in length, a deep pore exists on either side of its base: pores on snout generic. *Teeth*—villiform in both jaws, a few of the outer row and in the anterior portion of the premaxillaries being enlarged, somewhat conical but scarcely curved. *Fins*—dorsal spines weak, the first short, the two next from 4/5 to as long as the height of the body and three times as long as the rays. Pectoral as long as the head excluding the snout. Ventral reaches half way to the anal. Second anal spine rather above half the height of the first ray. Caudal wedge-shaped in the young, more obtuse in the adult. *Scales*—cycloid on the body and head: a few over the bases of the soft dorsal and anal fins. *Lateral-line*—curves to above the end of the soft dorsal, it is in single tubes, which bifurcate posteriorly. *Colours*—usually of a dark brown or coppery tinge, often nearly black and shot with golden, lightest along the abdomen. Fins reddish-brown, the first dorsal stained with black: other fins with gray edges: ventrals yellow.

Fig. 2 is from Madras, and of the most common colour there: fig. 3 is from Bombay, has a dark shoulder-spot and generally gray colour, which is the most common appearance in the latter locality: the specimen figured is 7 inches long.

Habitat.—Seas of India to China, attaining at least 8 or 9 inches in length.

4. **Umbrina Russellii**, Plate XLIII, fig. 4.

Labrus qualar-katchelee, Russell, Fish. Vizag. ii, p. 13, plate 118.

Umbrina Russellii, Cuv. and Val. v, p. 178; Richards. Ich. China, p. 226; Cantor, Catal. p. 71; Jerdon, M. J. L. & Sc. 1851, p. 132; Günther, Catal. ii, p. 278; Kner, Novara Fische, p. 131.

Umbrina Kuhlii, Cuv. and Val. v, p. 179; Bleeker, Sciæn. p. 19.

Sciœna Indica, (K. and v. Hass.) Cuv. and Val. v, p. 179.

Sciœna Kuhli, Bleeker, Bintang, p. 293.

Sciœna Russellii, Bleeker, Mémoire Sciénoid. 1874, p. 58.

B. vii, D. 10 | $\frac{1}{24-27}$, P. 17, V. 1/5, A. $\frac{2}{7}$, C. 17, L. l. $\frac{5\ 2}{4\ 4}$/$_{4\ 2}$, L. tr. 6/15, Cæc. pyl. 7 (8 Kner).

Length of head 1/4 to $4\frac{1}{3}$, of caudal 1/6, height of body $3\frac{3}{4}$ to 1/4 of the total length. *Eyes*—diameter $3\frac{1}{2}$ to 1/4 of length of head, 3/4 to 1 diameter from end of snout, and 1 apart. Greatest width of head equals half its length, its height equals its length excluding the snout. Snout overhanging the jaws, the upper slightly the longer; the maxilla reaches to below the last third of the orbit. Nostrils opposite the lower third of the eye. Distance between the eye and the upper jaw equals 3/4 of a diameter of the orbit. Preopercle distinctly serrated: two opercular spines. Barbel equals from 2/5 of the diameter of the eye to nearly as long as it. Pores on snout and lower jaw generic: shoulder-flap serrated. *Teeth*—villiform in both jaws, with an outer enlarged row in the anterior half of the premaxillaries. *Fins*—dorsal spines moderately strong, the fourth equal to $2\frac{1}{4}$ in the height of the body and 1/3 longer than the rays. Pectoral equal to the head excluding the snout. Ventral reaches half way to the anal. Second anal spine strong, 4/5 as long as the first ray, and nearly equal to half the length of the head. Caudal wedge-shaped. *Scales*—ctenoid. *Lateral-line*—curves to above the middle of the anal fin where it becomes straight, tubes with one or two branches from either

side. *Colours*—gray, becoming silvery-white on the abdomen : a steel-blue opercular spot : upper two-thirds of first dorsal nearly black : other fins yellow.

Habitat.—Seas of India to the Malay Archipelago, attaining at least 10 inches in length.

Genus, 2—Sciæna, *(Artedi) Cuv.*

Johnius, Bloch: *Corvina* and *Stellifer*, Cuv. : *Bola*, sp. Ham. Buch. : *Leiostomus*, Cuv. and Val. : *Coracinus*, Pall. : *Homoprion*, Holb. : *Amblyodon*, (Raf.) Gir. : *Cheilotrema*, v. Tsch. : *Genyonemus*, *Plagioscion*, *Sciænops*, *Bairdiella*, *Haploinodotus*, *Rhinoscion* and *Ophioscion*, Gill : *Diplolepis*, Steind. : *Pseudosciæna*, Bleeker.

Branchiostegals seven : pseudobranchiæ. Body oblong, rather elongated, and compressed. Eyes of moderate size. Interorbital space rather broad and slightly convex. Snout rounded, sometimes overhanging the upper jaw, which last is longer than the lower, or both are of equal length. No central barbel below the symphysis of the lower jaw. Teeth villiform, with an outer enlarged row in the premaxillaries, and sometimes the inner row in the mandibles enlarged. No distinct canines. Two dorsal fins, the first with 9-10 spines, and connected at its base to the second which is of moderate length (23-32 rays). Anal with one or two spines. Scales ctenoid or cycloid, extending over the head and snout, and generally more or less present on the vertical fins and on that of the tail. Air-vessel present.† Pyloric appendages in moderate numbers or few.*

Pores or the orifices of muciferous canals are found in most of the species of this genus, identically as described in *Umbrina*. But a few, evidently approaching towards *Otolithus*, have some or all absent from both jaws.

In one species, *Sciæna albida*, a small, though distinct barbel, is present at the anterior of the lateral open pores on the lower jaw. Whether very great stress ought to be laid upon whether the scales are ctenoid or cycloid appears open to doubt. (See *S. carutta*, *S. glaucus.*)

This genus has been subdivided by Bleeker into the following : 1. *Pseudosciæna*, in which the inner row of teeth in the lower jaw is distinctly larger than those external to it : 2. *Johnius*, destitute of any enlarged row of teeth in the lower jaw.

SYNOPSIS OF SPECIES.

A. An enlarged inner row of teeth in the lower jaw. (*Pseudosciæna.*)

1. *Sciæna Bleekeri*, D. 10 | $\frac{1}{27}$, A. $\frac{2}{7}$, L. l. 60, L. tr. 11/18. Eyes, diameter 1/5 of length of head. Second anal spine weak, $1\frac{1}{2}$ diameters of the orbit in length. Gray, with a dark axillary spot. First dorsal gray, fins edged with gray. Bombay.

2. *Sciæna miles*, D. 9-10 | $\frac{1}{28-30}$, A. $\frac{2}{7}$, L. l. 50, L. tr. 8/16. Eyes, diameter 2/9 to 1/5 of length of head. Second anal spine very strong and half the length of the head. Silvery, outer edges of vertical fins sometimes gray. Seas of India.

3. *Sciæna Vogleri*, D. 10 | $\frac{1}{28-29}$, A. $\frac{2}{7}$, L. l. 50, L. tr. 6/14. Eyes diameter 2/9 to 3/14 of length of head. Second anal spine weak, as long as the eye. Silvery, first dorsal dark. Seas of India to the Malay Archipelago.

4. *Sciæna sina*, D. 10 | $\frac{1}{27-29}$, A. $\frac{2}{7}$, L. l. 52. Eyes, diameter 1/4 of length of head. Second anal spine weak, 2/7 of length of head. Seas of India.

5. *Sciæna cuja*, D. 10 | $\frac{1}{27-29}$, A. $\frac{2}{7}$, L. l. 50. Eyes, diameter 1/5 of length of head. Second anal spine very strong, as long as the head behind the middle of the eyes. Oblique dark streaks above the lateral-line and horizontal ones below it. Estuaries of Ganges and Siam.

6. *Sciæna coitor*, D. 10 | $\frac{1-2}{26-29}$, A. $\frac{2}{7}$, L. l. 55. Eyes, diameter from 1/4 to 2/11 of length of head. Second anal spine strong, and as long as the postorbital portion of the head. Silvery. Large rivers of India and Burmah.

7. *Sciæna axillaris*, D. 10 | $\frac{1}{26-29}$, A. $\frac{2}{7}$, L. l. 50, L. tr. 6-7/14. Eyes, diameter 1/4 of length of head. Second anal spine strong, $2\frac{1}{3}$ in the length of the head. Silvery, upper two-thirds of first dorsal black, a dark axillary spot. Seas of India.

8. *Sciæna albida*, D. 9-10 | $\frac{1}{24-25}$, A. $\frac{2}{7}$, L. l. 52, L. tr. 7/18. Eyes, diameter 1/4 to 1/7 of length of head. Second anal spine strong, half as long as the head. Silvery, a diffused opercular blotch. Seas of India.

9. *Sciæna diacanthus*, D. 10 | $\frac{1}{23-24}$, A. $\frac{2}{7}$, L. l. 52, L. tr. 7/18. Eyes, diameter 2/9 to 1/6 of length of head. Second anal spine $2\frac{3}{4}$ in the length of the head. Brownish-gray superiorly, silvery below. Upper half of body, dorsal, and caudal fins spotted in the immature. Seas of India to the Malay Archipelago.

10. *Sciæna aneus*, D. 10 | $\frac{1}{23-24}$, A. $\frac{2}{7}$, L. l. 50, L. tr. 8-9/18. Eyes, diameter 1/4 to $4\frac{1}{4}$ in the length of head. Lower jaw the longer. Second anal spine weak, from 3/4 to 1 diameter of the orbit in length. Silvery, first dorsal gray. Seas of India to the Malay Archipelago.

11. *Sciæna maculata*, D. 10 | $\frac{1}{23-24}$, A. $\frac{2}{7}$, L. l. 45-48, L. tr. 8/16. Eyes, diameter $4\frac{1}{4}$ to 1/5 of length of head. Second anal spine 1/3 the length of head. Silvery, with five broad black bands, sometimes interrupted. Seas of India.

B. No enlarged inner row of teeth in the lower jaw. (*Johnius.*)

12. *Sciæna Belengeri*, D. 9 | $\frac{1}{27-32}$, A. $\frac{2}{7}$, L. l. 52, L. tr. 6/14. Eyes, diameter $3\frac{1}{2}$ to $3\frac{3}{4}$ of length of head. Second anal spine $2\frac{1}{4}$ in length of head. Slate-coloured, with the vertical fins nearly black. Seas of India to the Malay Archipelago.

* *Sciæna aneus*, Bloch, is an exception, forming a transitional state to genus *Otolithus* not only in this respect, but in the pores on the snout, and below the symphysis of the mandibles.

† Stated to be absent in some American species.

13. *Sciæna semiluctuosa*, D. 10 | $\frac{1}{28-31}$, A. $\frac{2}{7}$, L. l. 55-60, L. tr. 8-9/25. Eyes, diameter 2/9 to 1/6 of length of head. Second anal spine about 1/2 the length of head. Gray, with blackish bands going along each row of scales: fins black. Seas of India to China.

14. *Sciæna glaucus*, D. 10 | $\frac{1}{28-30}$, A. $\frac{2}{7}$, L. l. 50, L. tr. 6/18. Eyes, diameter $3\frac{3}{4}$ to $4\frac{1}{4}$ in length of head. Second anal spine 2/5 of length of head. Gray, a diffused bluish opercular blotch: an axillary spot: first dorsal nearly black: vertical fins with gray edges. Seas of India.

15. *Sciæna carutta*, D. 10 | $\frac{1}{25-28}$, A. $\frac{2}{7}$, L. l. 50, L. tr. 5-6/18. Eyes, diameter 1/4 of length of head. Second anal spine 2/7 to 2/5 of length of head. Purplish-brown, with a light band along the lateral-line. Fins dark. Seas of India to the Malay Archipelago.

16. *Sciæna osseus*, D. 10 | $\frac{1}{25-26}$, A. $\frac{2}{7}$, L. l. 50, L. tr. 6/15. Eyes, diameter 1/5 of length of head. Second anal spine 1/4 as long as the head. Gray, with the fins stained at their edges. Malabar.

A. An enlarged inner row of teeth in the lower jaw (*Pseudosciæna*).

1. **Sciæna Bleekeri**, Plate XLV, fig. 4.

Soh-lee, Bel.

B. vii, D. 10 | $\frac{1}{24-27}$, P. 17, V. 1/5, A. $\frac{2}{7}$, C. 17, L. l. $\overset{85-90}{\frac{60}{70}}$, L. tr. 9-10/18.

Length of head $4\frac{1}{4}$, of caudal $5\frac{1}{2}$, height of body $4\frac{3}{4}$ in the total length. *Eyes*—diameter 1/5 to 1/7 of length of head, $1\frac{1}{4}$ to 2 diameters from end of snout, and 1 apart. Greatest width of head equals 2/5 of its length, and the height equals its length excluding the snout. Dorsal profile more convex than that of the abdomen, a slight concavity over the eyes: head rather strongly compressed. Snout not overhanging the jaws, cleft of mouth somewhat oblique, the jaws of about the same length anteriorly, the maxilla reaches to below the last third of the eye, whilst superiorly its anterior extremity is on a level with the lower edge of the eye. The distance between the eye and the upper edge of the maxilla equals 2/3 of the diameter of the orbit. Preopercle with some rather strong denticulations and three well-marked ones at the angle: two opercular spines. Shoulder-scale strongly serrated. A pore above the centre of the free edge of the skin of the snout, and a smaller one on either side, but no lateral lobe. Five pores on under surface of lower jaw below the symphysis. *Teeth*—villiform in both jaws, with an outer row of curved conical ones in the premaxillaries: whilst the inner row in the lower is much larger than the rest of the teeth. *Fins*—fourth to sixth dorsal spines of about the same height, one-third higher than the rays and equal to about $2\frac{1}{2}$ in that of the body. Pectoral equals two-thirds of the height of the body. Ventral reaches half way to the anal fin. Second anal spine weak, half the length of the first ray and about equal to $1\frac{1}{2}$ diameters of the orbit, the length of its base equals $4\frac{1}{2}$ of that of the soft dorsal. Caudal wedge-shaped. *Scales*—cycloid on snout and under the eyes, ctenoid elsewhere. *Lateral-line*—curves to above the middle of the anal fin, the tubes have simple bifurcations. *Colours*—Silvery-gray along the back, becoming dull white below: a black spot in the axilla. First dorsal gray with a light line along its centre: caudal dark in its outer third, fins otherwise yellowish.

This species appears to be closely allied to *Johnius microlepis*, Bleeker, Sumatra, p. 11, or *Pseudosciæna microlepis*, Bleeker, Mém. Scién. 1874, p. 23, but its anal spine is not nearly so long and its eye is much smaller.

Habitat.—Bombay, from whence two specimens were procured, the largest, which is figured, being nearly 8 inches in length. Large specimens from 27 inches in length were not uncommon at Gwadur where the fish is extensively salted.

2. **Sciæna miles**, Plate XLIII, fig. 5.

Holocentrus miles, Lacép. iv, p. 244.

Labrus tella katchelee, Russell, Fish. Vizag. ii, p. 13, f. 117.

Corvina miles, Cuv. and Val. v, p. 94, ix, p. 479; Jerdon, M. J. L. and Sc. 1851, p. 131; Bleeker, Sciæn. p. 17; Günther, Catal. ii, p. 300.

Corvina soldado, Cantor, Catal. p. 70.

Corvina Wolfii, Bleeker, Borneo, p. 66.

Corvina sampitensis, Bleeker, Borneo, p. 421.

Corvina Celebica, Bleeker, Celebes, p. 244.

Corvina dorsalis, Peters, Fische Mozam. p. 242.

Johnius Celebicus, Bleeker, Enum. Pisc. p. 35.

Johnius miles, Bleeker, Pinang, p. 75.

Pseudosciæna miles, Bleeker, Mémo. Scién. 1874, p. 25.

Vella kattelee, Tam.

B. vii, D. 9-10 | $\frac{1}{28-30}$, P. 17, V. 1/5, A. $\frac{2}{7}$, C. 17, L. l. $\overset{62-65}{\frac{50}{55-60}}$, L. tr. 8/16.

Length of head $4\frac{1}{4}$ to $4\frac{1}{2}$, of caudal 1/6, height of body $3\frac{1}{4}$ to 1/4 of the total length. *Eyes*—diameter $4\frac{1}{2}$ to 1/5 of length of head, $1\frac{1}{4}$ diameters from end of snout, and 1 apart. Greatest width of head equals half its length, and its height equals its length excluding the snout. Cleft of mouth moderately oblique. Snout not overhanging the jaws which are of about equal length anteriorly, or the upper slightly the longer, the maxilla reaches to below the last third of the eye. Preopercle with some rather widely separated denticulations especially at its rounded angle: two opercular points. Free border of the skin of the snout with five orifices of canals and a small lateral lobe: five pores on the inferior surface of the lower jaw. *Teeth*—villiform in the upper jaw, with an outer row of large curved conical ones in the premaxillaries: villiform in the lower jaw with the inner row consisting of distantly

placed enlarged ones. *Fins*—dorsal spines weak, nearly twice as long as the rays, and from $1\frac{2}{3}$ to 1/2 as high as the body. Pectoral as long as the head excluding the snout. Ventral reaches rather above half way to the anal. Second anal spine very strong, nearly as long as the first ray and equal from 1/2 the length of the head to its length behind the middle of the eyes: the extent of the base of the fin from 1/4 to 1/5 of that of the soft dorsal. Caudal wedge-shaped. *Scales*—cycloid on head and chest, ctenoid on the remainder of the body. *Lateral-line*—becomes straight above the hind edge of the anal, its tubes arborescent posteriorly. *Colours*—grayish darkened with green along the back, becoming white on the sides and abdomen, sometimes a small brown spot in front of each dorsal ray. Outer edges of the fins in some specimens dark, except the ventral which is white.

Habitat.—Seas of India to the Malay Archipelago, attaining at least 2 feet in length. The specimen figured, from Bombay is 10 inches long.

3. Sciæna Vogleri, Plate XLV, fig. 1.

Otolithus Vogleri, Bleeker, Sumatra, p. 253.
Sciæna Vogleri, Günther, Catal. ii, p. 294.
Pseudosciæna Vogleri, Bleeker, Mémoir. Scién. 1874, p. 35.

B. vii, D. 10 | $\frac{1}{28-29}$, P. 19, V. 1/5, A. $\frac{2}{7}$, C. 17, L. r. $\frac{52}{\frac{50}{45}}$, L. tr. 6/14, Cæc. pyl. 9.

Length of head $3\frac{2}{3}$, of caudal $6\frac{1}{2}$, height of body 1/4 to $4\frac{1}{4}$ in the total length. *Eyes*—diameter $4\frac{1}{2}$ to $4\frac{2}{3}$ in the length of head, 1 to $1\frac{1}{4}$ diameters from the end of snout, and also apart. Body rather compressed, the dorsal profile more convex than the abdominal. Width of head equals $1\frac{3}{4}$ in its length, its height equals its length excluding the snout. The snout does not overhang the upper jaw which is very slightly longer than the lower, cleft of the mouth oblique, the maxilla reaching to below the middle of the orbit. Preopercle distinctly but finely serrated: two opercular spines: the distance between the eye and the maxilla equals 1 diameter of the orbit. Five large open pores under the symphysis of the lower jaw, also five orifices along the free edge of the skin of the snout. The shoulder-scale serrated. *Teeth*—villiform in both jaws, with an outer row of large, curved, and rather distantly placed ones in the premaxillaries: and an internal row of large conical and rather widely separated ones in the lower jaw. *Fins*—dorsal spines of moderate strength, the second to the fifth subequal in length, from 2 to $2\frac{1}{4}$ in the height of the body, and 1/3 higher than the rays. Pectoral as long as the head behind the first fourth of the eye. Ventral scarcely reaches half way to the anal. Second anal spine weak, half the height of the first ray, and $4\frac{1}{2}$ in that of the body. Caudal wedge-shaped. *Scales*—cycloid on the head, ctenoid over the chest and body: the base of the soft dorsal fin rather thickly scaled. *Lateral-line*—becoming straight opposite the posterior portion of the anal fin, its tubes with one or two branches. *Colours*—silvery, glossed with golden, first dorsal dotted with black, most distinctly so in its upper half: superior edge of soft dorsal and last half of caudal gray: a small dark spot sometimes present in the axilla: fins yellow.

Habitat.—Seas of India to the Malay Archipelago. The largest specimen I have taken is $10\frac{1}{2}$ inches in length.

4. Sciæna sina, Plate XLIV, fig. 2.

Johnius sina, Cuv. and Val. v, p. 122; Blyth, J. A. S. of Beng. 1860, p. 141.
Corvina sina, Belang. Voy. Ind. Orient. Zool. p. 359; Bleeker, Verh. Bat. Gen. xxvi, p. 82; Jerdon, M. J. L. and Sc. 1851, p. 132.
Sciæna sina, Günther, Catal. ii, p. 292; Day, Fish. Malabar, p. 52.
Booroo and *Souwah* or *Soor*, Sind.: *Goal*, Bel.

B. vii, D. 10 | $\frac{1}{27-29}$, P. 17, V. 1/5, A $\frac{2}{7-8}$, C. 17, L. r. $\frac{52}{\frac{52}{46}}$, L. tr. 8/14, Cæc. pyl. 9.

Length of head 1/4 to 2/9, of caudal 1/5 to 2/11, height of body 2/7 to 1/4 of the total length. *Eyes*—diameter 1/4 of length of head, 1 diameter from end of snout, and $1\frac{1}{4}$ apart. Height of head equals its length excluding the snout, and its width $1\frac{3}{4}$ of its length. Snout rather inflated, scarcely overhanging the jaws: jaws of nearly equal length anteriorly: cleft of mouth nearly horizontal, the maxilla reaching to below the last third or hind edge of the orbit. The distance from the eye to the upper jaw equals 1/2 to 3/4 of a diameter of the orbit. Preopercle rounded, generally some distinct spinate teeth at its angle. Snout with three pores across its base: the free edge of the skin with a large central opening, and another externally on either side, no large lateral lobe: shoulder-flap serrated. Five open pores under the symphysis of the mandible. *Teeth*—villiform, with an outer curved row of rather distantly placed ones in the upper jaw, and an inner enlarged row in the mandible. *Fins*—dorsal spines rather weak, third and fourth the longest and equal to $2\frac{1}{4}$ in the height of the body. Pectoral as long as the head without the snout. Ventral reaches nearly 1/2 way to the anal. Second anal spine more than half the height of the first ray, and equal to $3\frac{3}{4}$ in that of the body: the base of the fin equal to 2/7 of that of the soft dorsal. Caudal wedge-shaped. *Air-vessel*—large anteriorly, bulging on either side like a hammer, whilst from it descends an appendage on each side: posteriorly it ends in a sharp point. *Scales*—ctenoid, except on the head where they are cycloid, a few exist on the bases of the soft dorsal and anal fins. *Lateral-line*—becomes straight over the middle of the anal fin: each tube gives off a branch on either side. *Colours*—silvery, tinged with brownish along the back, and shot with gold on the abdomen: first dorsal blackish, especially in its outer half, the other fins gray.

This fish attains a very large size on the Western coast of India and Sind, even so far as Gwadur. They are not much valued as food but their air-vessels are extensively collected for isinglass. In Bombay and Sind

there are daily to be seen in the markets examples of this fish and *S. glaucus* of 5 or 6 or even more feet in length. Females in full spawn are common in April.

Habitat.—Seas of India, attaining several feet in length, the one figured is 6 inches long. McClelland in his paper on isinglass in the Calcutta Journal of Natural History, refers the *Soor* (spelt *Seer*) fish from which the sounds are collected at Kurrachee, to a *Polynemus*, but it is a *Sciæna*, and as described above or *S. glaucus*.

5. Sciæna cuja.*

Bola cuja, Ham. Buch. Fish. Ganges, pp. 81, 369, pl. xii, f. 27.

Corvina cuja, Cuv. and Val. v, p. 96; Temm. and Schleg. Fauna Japon. Poiss. p. 58; Blyth, Journ. As. Soc. of Bengal, 1860, p. 141; Günther, Catal. ii, p. 300.

Sciænoides asper, Blyth, l. c. p. 140 (*young*).

B. vii, D. 10 | $\frac{1}{27-29}$, P. 17, V. 1/5, A. $\frac{2}{7}$, C. 17, L. l. $\frac{60}{\frac{50}{54}}$, L. tr. 7/16.

Length of head 1/4 to 2/9, of caudal 1/8, height of body $3\frac{1}{2}$ to 1/4 of the total length. *Eyes*—diameter 1/5 of length of head, 1 diameter from end of snout, and also apart. Profile along the upper surface of the head somewhat concave: snout not swollen: jaws of nearly the same length anteriorly, or the lower slightly the longer. Greatest width of the head equals $2\frac{1}{4}$ in its length, and its height equals its length behind the front nostril. Cleft of mouth somewhat oblique, the maxilla reaches to below the hind edge of the orbit. The distance between the eye and the upper jaw equals 3/5 of the diameter of the orbit. In the fry the upper edge of the orbit is serrated and two rough ridges pass backwards from it. Preopercle scarcely denticulated: two opercular spines. Three open pores across the base of the snout, and five large ones along the edge of the free portion of the skin, but no lateral lobe. One central pore below the symphysis of the lower jaw, and two large ones on either side posterior to it. *Teeth*—villiform in either jaw, with an outer row of enlarged, curved, rather distantly placed and comparatively small ones in the anterior half of the premaxillaries: the inner row in the lower jaw is slightly larger than the villiform bands. *Fins*—dorsal spines strong, the second to the fourth the longest, one third higher than the rays, and equal to the length of the postorbital portion of the head. Pectoral as long as the head behind the middle of the eyes. Second anal spine very strong, nearly or quite as long as the first ray and equalling the length of the head behind the middle of the eyes. Caudal rounded. *Scales*—cycloid on the head, ctenoid on the body, the basal third of the soft dorsal and anal densely scaled: those on the summit of the head to the end of the occiput very much smaller than those on the body. *Lateral-line*—the tubes divide posteriorly into many branches. *Colours*—oblique dark streaks, following the rows of scales, exist above the lateral-line, horizontal ones below it. Both dorsals with two or three rows of black spots.

Habitat.—Estuaries of the Ganges, and Japan. It attains to several feet in length.

6. Sciæna coitor, Plate XLIV, fig. 3.

Bola coitor, Ham. Buch. Fish. Ganges, pp. 75 and 368, pl. 27, f. 24.

Corvina coitor, Cuv. and Val. v, p. 116; Günther, Catal. ii, p. 301.

Johnius coitor, Blyth, J. A. S. of Beng. 1860, p. 141.

Corvina nalla-katchelee, Richards. Ich. China, p. 226.

Botahl and *Putteriki*, Ooriah: *Nga-ta-dun* and *Nga-pok-thin*, Burm.

B. vii, D. 10 | $\frac{1-2}{26-29}$, P. 17, V. 1/5, A. $\frac{2}{7}$, C. 17, L. l. $\frac{58}{\frac{50-55}{52-56}}$, L. tr. 5-6/15, Cæc. pyl. 6-7 (9 Madras).

Length of head $4\frac{1}{4}$ to $4\frac{2}{3}$, of caudal $5\frac{1}{4}$ to 1/6, height of body $4\frac{1}{2}$ to $4\frac{3}{4}$ in the total length. *Eyes*—diameter from 1/4 to $5\frac{1}{2}$ in the length of head, $1\frac{1}{2}$ to 2 diameters from the end of snout, and from 3/4 to $1\frac{1}{3}$ apart. Greatest width of head equals one and two-thirds in its length, its height equals its length excluding the snout. Snout scarcely overhanging the jaws but prominent and swollen superiorly, upper jaw somewhat the longer. Interorbital space nearly flat, and the profile over the eyes rather concave. The distance between the eye and the upper edge of the maxilla equals from 3/4 to 1 diameter of the eye. Preopercle serrated, most distinctly so at its angle: two weak opercular spines. Shoulder-flap finely serrated. Three small open pores across the snout, and five much larger ones along the free edge of the skin of the snout, whilst there is a well developed lateral lobe. One central and two lateral orifices below the symphysis of the lower jaw. *Teeth*—villiform in both jaws, with an external slightly enlarged row in the premaxillaries, and an inner similar one in the lower jaw. *Fins*—dorsal spines weak, the second to the fourth the longest and equal to 2/3 the height of the body and 1/4 more than the rays. Pectoral equal to the length of the head behind the front nostril. Second anal spine rather strong, 4/5 as high as the first ray and equal to the length of the postorbital portion of the head, the length of the base of the fin equals from $3\frac{1}{2}$ to 1/4 of that of the soft dorsal. Caudal wedge-shaped. *Scales*—cycloid on the snout and below the eyes, elsewhere ctenoid. *Lateral-line*—makes a gradual curve, and above the commencement of the anal becomes straight, its tubes give off a single branch on either side. *Colours*—silvery shot with gold and purple, upper half of first dorsal blackish: soft dorsal, caudal, and anal dark externally, whilst the last fin has a darkish basal band.

This fish appears to vary considerably. Burmese and Bengal adult specimens have six or seven cæcal appendages, and an eye from 1/5 to $5\frac{1}{2}$ in the length of the head. In southern Madras, adults have nine cæcal appendages and an eye about 1/4 the length of the head. *Sciæna (Corvina) nasus*, Steind. Verh. z. b. Ges. Wien, 1866, p. 771, t. xv, f. 1, is probably this species.

* *Johnius serratus*, Bl. Schn. p 76, has been referred to this fish, it came however from Tranquebar where *S. cuja* is not found.

A specimen of this fish, $6\frac{1}{8}$ inches in length, exists in the Berlin Museum, it was received from Paris with the label *Corvina furcræa*, and stated to have come from the Ganges. The true *Perca furcræa*, Lacép. or *Corvina furcræa*, Cuv. and Val. is described and figured by Steindachner as the *Pachypops furcræus* from the Brazils. (Verh. z. b. Ges. Wien, 1866, p. 4, t. i.)

Cantor's specimen of *Johnius Dussumieri* (Catal. p. 64), which is a skin, appears to me to be identical with the foregoing, but its anal spine is a little short, being $2\frac{1}{4}$ in the length of the head, whilst the length of the base of its anal equals $4\frac{2}{3}$ in that of the length of the base of the soft dorsal. Another of the specimens in the British Museum seems to be *S. Vogleri*. The species I formerly (Fishes of Malabar, p. 51) described as *Sciæna Dussumieri* I now find is not identical with that species (see p. 192). It appears so doubtful as to what *Corvina Dussumieri* (C.V. v, p. 119) is, that I have omitted it. The description approaches most closely to that of *Sciæna sina* amongst the species of this Genus which I have collected in Malabar.

Habitat.—Throughout the larger rivers of India and Burmah, descending to the sea at certain seasons: it attains a foot in length. The one figured (an adult) is from the Irrawaddi.

7. Sciæna axillaris, Plate XLIII, fig. 6.

Corvina axillaris. Cuv. and Val. v, p. 113; Belanger, Voy. Ind. Orient. Zool. p. 356; Günther, Catal. ii, p. 302; Day, Fish. Malabar, p. 53.

B. vii, D. 10 | $\frac{1}{26\text{-}29}$, P. 17, V. 1/5, A. $\frac{2}{7}$, C. 17, L. l. $\frac{54}{\frac{50}{52}}$, L. tr. 6-7/14, Cæc. pyl. 9.

Length of head $4\frac{1}{4}$ to $4\frac{1}{2}$, of caudal 1/6, height of body $3\frac{1}{3}$ to $3\frac{2}{3}$ in the total length. *Eyes*—diameter 1/4 of length of head, 3/4 to 1 diameter from end of snout, and $1\frac{1}{4}$ apart. Dorsal profile more convex than that of the abdomen. Greatest width of head equals half its length, and its height its length excluding the snout. Snout not overlapping the jaws, the jaws of about equal length anteriorly: the maxilla reaches to below the hind edge of the eye. Vertical limb of preopercle serrated, most strongly so at its angle. Two opercular spines. Distance from the eye to the maxilla equals two-thirds of the diameter of the orbit: shoulder-flap with smooth edges. No open glands visible across the snout nor lateral lobes. A knob below the symphysis of the lower jaw and two open pores behind it on either side. *Teeth*—villiform, with an outer curved row of rather strong ones in the premaxillaries, whilst the inner row in the lower jaw is twice as strong as the remainder. *Fins*—dorsal spines of moderate strength, the fourth and fifth the longest, equal to $2\frac{1}{2}$ in the height of the body, and 1/3 longer than the rays. Pectoral equals the head excluding the snout. Ventral reaches two-thirds of the way to the anal, its first ray elongated. Second anal spine strong, 3/4 as long as the first ray and equal to $2\frac{1}{3}$ in the height of the body, the length of the fins base equals $3\frac{1}{2}$ in that of the soft dorsal. Caudal wedge-shaped. *Scales*—cycloid on the head and as far as the bases of pectoral and ventral fins, superiorly they extend to below the middle of the first dorsal, posterior to these places they become ctenoid. *Lateral-line*—curves to opposite the commencement of the anal, its tubes are arborescent posteriorly. *Colours*—silvery dashed with purple, a black spot in the axilla: upper two-thirds of the first dorsal black, and a dark tinge along the top of the first portion of the second: fins greyish.

Habitat.—Seas of India. The specimen (figured life-size) from Orissa, was taken along with two others, the largest, captured at Madras in April, 1868, was a female $6\frac{1}{2}$ inches in length, and full of well developed ova.

8. Sciæna albida, Plate XLIV, fig. 4 and 6.

Bola coibor, Ham. Buch. Fish. Ganges, pp. 78, 368.

Corvina albida, Cuv. and Val. v, p. 93; Belanger, Voy. Ind. Zool. p. 355; Günther, Catal. ii, p. 304; Day, Fish. Malabar, p. 54.

Johnius anei, Blyth, Proc. Asi. Soc. Beng. 1860, p. 141 (not Bloch).

Corvina Neilli, Day, Fish. Malabar, p. 55.

Vella kattelee and *Karoom kattelee*, Tam.

B. vii, D. 9-10 | $\frac{1}{24\text{-}25}$, P. 18, V. 1/5, A. $\frac{2}{7}$, C. 17, L. l. $\frac{55\text{-}60}{\frac{52}{50\text{-}55}}$, L. tr. 7/18, Cæc. pyl. 5.

Length of head $3\frac{3}{4}$ to 1/5, of caudal 1/6 to 1/7, height of body 1/4 of the total length. *Eyes*—diameter 1/4 in the young to 1/7 in the adult* in the length of head, and from 1 to $1\frac{1}{4}$ diameters from the end of the snout. Dorsal and abdominal profiles about equally convex in the adult. Greatest width of head equals half its length, and its height equals its length excluding the snout. Interorbital space very slightly convex: snout not overhanging the mouth. Jaws equal in front, or the upper slightly the longer, cleft of mouth slightly oblique, the maxilla reaching to below the last third or hind edge of the eye. Preopercle with some serrations in the young most developed at its angle, but which become indistinct in the adult. Opercular spines indistinct. Three pores across the front of the snout: the free edge of the skin of the snout with five orifices and a slight lateral lobe. A bluntish knob below the symphysis of the lower jaw behind the base of which is a large open pore, and two more on the side of either ramus: a short barbel exists between the central pore and anterior lateral one, and a very minute one at the posterior pore. *Teeth*—villiform with an outer row of large curved ones in the premaxillaries: whilst the inner row in the lower jaw also consists of enlarged pointed teeth. *Fins*—dorsal spines increase in length to the third which is one-fourth higher than the rays, and equals from $1\frac{3}{4}$ to 1/2 the height of the body. Pectoral as long as the head excluding the snout and a little longer than the ventral, which latter reaches half way to the anal. Second anal spine strong, nearly as long as the first ray and equal to 1/2 or 2/3 the height of the body. Caudal

* Specimens 8 inches long have the diameter of the eye 1/4 in the length of the head, $4\frac{3}{4}$ at 11 inches: $5\frac{3}{4}$ at 15 inches, and 1/7 in very large ones. This atrophy is not peculiar to this species.

wedge-shaped in the young, rounded in the adult. *Scales*—cycloid on head, elsewhere ctenoid, fine ones covering the bases of the soft dorsal and anal, and in the adult the whole of the caudal fin; those anterior to the base of the first dorsal fin are much smaller than those posteriorly. *Lateral-line*—becomes straight opposite the anal fin: the tubes are arborescent posteriorly. *Colours*—silvery, with a light streak along each row of scales, the first dorsal in the young with a black interspinous membrane, but only having a black outer edge in the adult: second dorsal stained gray at the upper third. A dark bluish mark on the opercles, most distinct in the young. Ventral, anal, and caudal yellowish.

In Indian specimens there are as a rule only nine spines in the first dorsal fin, and the first of these is very short.

The two figures show the marine form (fig. 4) at $8\frac{1}{2}$ inches in length, the tail is longer and the colours much lighter. Fig. 6 is the estuary species as found off Calcutta, the back is dark and the lower surface brilliant golden: a dark spot on the axilla.

Habitat.—Seas of India (China ?): termed *Sapé katelé* at Pondicherry. It is a common species, but not in much esteem for the table, it attains at least 3 feet in length.

9. Sciæna diacanthus.

Lutjanus diacanthus, Lacép. iv, pp. 195, 244.
Labrus nella katchelee, Russell, ii, p. 11, pl. 115.
Labrus katchelee, Russell, ii, p. 12, pl. 116 (*young*).
Bola chaptis, Ham. Buch. Fish. Ganges, pp. 77, 368, pl. 10, f. 25.
Johnius cataleus, Cuv. and Val. v, p. 128; Blyth, J. A. S. of Beng. 1860, p. 141.
Johnius chaptis, Cuv. and Val. v, p. 130; Blyth, J. A. S. of Beng. 1860, p. 141.
Corvina catalea, Cuv. and Val. v, p. 128; Belanger, Voy. Ind. Orient. p. 360; Richards. Ich. China, p. 226; Jerdon, M. J. L. and Sc. 1851, p. 131; Bleeker, Sciæn. p. 18.
Corvina platycephala, Cuv. and Val. v, p. 132.
Sciæna maculata, Gray and Hardw. Ill. Ind. Zool. ii, p. 89, f. 1 (*young*).
Johnius diacanthus, Cantor, Catal. p. 67; Bleeker, Java, p. 326; Kner, Novara Fische, p. 133.
Johnius Valenciennei, Eyd. Soul. Voy. Bonito, i, p. 150, t. i, f. 2.
Johnius maculatus, Blyth, J. A. S. of Beng. 1860, p. 141.
Sciæna diacanthus, Günther, Catal. ii, p. 290.
Pseudosciæna diacanthus, Bleeker, Mém. Scién. 1874, p. 27.

B. vii, D. 10 | $\frac{1}{23-24}$, P. 18-19, V. 1/5, A. $\frac{2}{7}$, C. 17, L. l. $\frac{72}{\frac{52}{60}}$, L. tr. 7/18, Cæc. pyl. 8.

Length of head 1/4 to $4\frac{1}{4}$, of caudal 1/6, height of body $4\frac{1}{4}$ to 1/5 of the total length. *Eyes*—diameter $4\frac{1}{2}$ to 1/6 of length of head, $1\frac{1}{4}$ to $1\frac{1}{2}$ diameters from end of snout, and also apart. Greatest width of the head equals $1\frac{3}{4}$ in its length, and the height equals its length excluding the snout. Snout slightly inflated, upper jaw a little the longer, cleft of mouth oblique, the maxilla reaches to below the last third of the orbit. The distance from the eye to the upper jaw equals 2/3 of the diameter of the orbit. Margin of preopercle crenulated in the adult, in the immature the angle is denticulated: two opercular points. Snout with three open pores across its base, and three openings along the free edge of the skin, but no lateral lobe. Five open pores under the symphysis of the lower jaw. Shoulder-flap finely serrated. *Teeth*—villiform in either jaw, with an outer row of curved, conical, and distantly placed ones in the premaxillaries, and an inner enlarged row in the mandibles. *Fins*—dorsal spines weak, increasing in length to the third and fourth which are 1/4 higher than the rays, and 2 to $2\frac{1}{4}$ in the height of the body. Pectoral equals the length of the head behind the middle of the eyes. Ventral reaches nearly half way to the base of the anal. Second anal spine moderately strong, at least half as long as the rays and equal to $2\frac{3}{4}$ in the length of the head: the length of the base of the fin equals 1/3 to 2/7 of the base of the soft dorsal. Caudal wedge-shaped. *Scales*—ctenoid except on the snout and below the eyes. *Lateral-line*—becomes straight above the end of the anal fin, the tubes are arborescent posteriorly. *Colours*—brownish-gray shot with silver along the back, which below the lateral-line gradually fades to dull silvery-gray, head of the same colour glossed with purple. Fins yellowish, with black dots. Eyes golden. In the *immature* as up to a foot and a half in length or even more, the fins are grayish with dark edges, and the dorsal has two rows of dark spots: the caudal also has black spots and a black edge. In still younger specimens the back and upper half of the body has many black spots, and the young are as a rule vertically banded.

Russell observes that his plate 116, or the *maculata*, Gray and Hard. was believed by the fishermen to be the female: I have dissected many males however having this form of colour.

Habitat.—Seas of India to the Malay Archipelago and China, attaining at least 5 feet in length: it ascends tidal rivers and estuaries, and is found in the Hooghly as high as Calcutta.

10. Sciæna aneus, Plate XLV, fig. 5.

Johnius aneus, Bloch, t. 357.
Corvina anei, Cuv. and Val. v, p. 131.
? *Corvina sina*, Schleg. Fauna Japon, p. 58, pl. 24, f. 2 (not Cuv. and Val.)
Otolithus macrophthalmus, Bleeker, Sciæna, p. 16, and Java, Gen. et Spec. nov. p. 99.
Sciæna macrophthalmus, Günther, Catal. ii, p. 291.
Otolithus aneus, Day, Proc. Zool. Soc. 1867, p. 939.
Corvina macrophthalmus, Bleeker, Bintang, p. 292.

Pseudosciæna macrophthalmus, Bleeker, Mém. Scién. 1874, p. 21.

Pennah, Tam.: *Chal-burn-dah*, Andam.

B. vii. D. 10 | $\frac{1}{23-24}$, P. 18, V. 1/5, A. $\frac{2}{7}$, C. 17, L. l. $\frac{56}{\frac{50}{50}}$, L. tr. 8-9/18, Cæc. pyl. 10.

Length of head $3\frac{2}{3}$ to 1/4, of caudal 1/7 to 1/8, height of body 1/4 to $4\frac{1}{4}$ in the total length. *Eyes*—diameter 1/4 to $4\frac{1}{4}$ in the length of head, 1 to $1\frac{1}{4}$ diameters from end of snout and also apart. Greatest width of head equals 4/7 of its length, and the height equals its length behind the posterior nostril. Interorbital space nearly flat, snout not overhanging the mouth, the lower jaw the longer. Cleft of mouth oblique, the maxilla reaches to below the middle of the eye: the distance between the eye and the upper edge of the maxilla equals from 1/2 to 3/4 of the diameter of the orbit. Nostrils large and opposite the upper third of the orbit. Preopercle finely but widely serrated along both limbs, its lower edge very strongly serrated in the young: two opercular spines. Shoulder-flap entire. A small pore on either side of the snout just above the free edge of the skin. A small open pore on either side of the symphysis of the lower jaw on its under surface. *Teeth*—villiform in the upper jaw, with an outer conical row of distantly placed ones becoming canine-like near the symphysis. In the lower jaw an internal row of distantly placed conical teeth having a few villiform ones between or external to them. *Fins*—dorsal spines of moderate strength, the second to the fifth the longest, one-third higher than the rays, and equal to from 1/2 to $2\frac{1}{3}$ in the height of the body. Pectoral equals the length of the head excluding the snout. Ventral scarcely reaches half-way to the vent. Second anal spine weak, and from 3/4 to 1 diameter of the orbit in length, the length of the base of the fin equals from 1/4 to $4\frac{1}{4}$ in that of the soft dorsal. Caudal slightly rounded, cut square, or even a little emarginate. *Scales*—cycloid except in the posterior portion of the body where they are feebly ctenoid. *Lateral-line*—tubes become arborescent posteriorly. *Air-vessel*—oval with about 30 lateral processes on either side and extending the whole length of the abdomen. Dr. Ogg, chemical examiner at Madras (1867), found the isinglass very inferior. *Colours*—silvery-gray, becoming dull white along the abdomen: first dorsal black tipped or stained with dark gray: second dorsal grayish, lightest along its centre. Pectoral, ventral, and anal yellowish. Caudal tipped with gray.

In the Museum at Paris there is a specimen labelled as above and brought from Batavia by M. Raynaud.

Habitat.—Seas of India to the Malay Archipelago, it is very common at Madras up to 8 or 9 inches in length. It is not rare at Bombay or the Andamans: the specimen figured is $5\frac{1}{2}$ inches long and from Madras.

11. Sciæna maculata.

Johnius maculatus, Bl. Schn. p. 75; Cantor,* Catal. p. 68 (not synon.); Blyth, J. A. S. of Beng. 1860, p. 141 (not syn.).

Perca sari-kullah, Russell, Fish. Vizag. ii, p. 17, pl. 123.

Corvina maculata, Cuv. and Val. v, p. 126; Jerdon, M. J. L. and Sc. 1851, p. 132.

Sciæna maculata, Günther, Catal. ii, p. 291; Day, Fish. Malabar, p. 50.

Cooroowa and *Vari katchelee*, Tam.: *Cutlah*, Mal.: *Tuan-tah*, Bel.

B. vii, D. 10 | $\frac{1}{23-24}$, P. 18, V. 1/5, A. $\frac{2}{7}$, C. 17, L. l. $\frac{65}{\frac{45-48}{58}}$, L. tr. 8/16, Cæc. pyl. 8.

Length of head $3\frac{1}{2}$ to $3\frac{2}{3}$, of caudal from 1/5 to 1/6, height of body $3\frac{1}{2}$ to 1/4 of the total length. *Eyes*—diameter $4\frac{1}{4}$ to 1/5 of length of head, $1\frac{1}{4}$ diameters from end of snout, and 1 apart. Width of head equals 1/2 its length, and its height 4/5 of the same extent. Upper jaw overlapping the lower, and being itself overhung by the snout: the maxilla reaches to below the middle or last third of the eye. Preopercle with about six widely separated but rather strong denticulations at its angle, and its lower border crenulated in the young: opercle with two rather obtuse spines. Shoulder-flap serrated. A transverse row of four pores across the snout, the free edge of the skin with five orifices and a lateral lobe. A central pore below the mandibular symphysis, having two more on either side of it. *Teeth*—villiform in the upper jaw with an outer row of conical curved ones most developed near the median line: in the lower jaw villiform in several rows above the symphysis, whilst laterally the inner row consists of curved, enlarged teeth, and the outer villiform ones soon disappear. *Fins*—dorsal spines of moderate strength, the third to the seventh being the longest and equal to half the height of the body and one-third higher than the second dorsal fin. The pectoral equals the length of the head excluding the snout. Ventral reaches half way to the vent, its outer ray prolonged. Second anal spine 2/3 as long as first ray, and equals about 1/3 of the height of the body, length of the base of the fin 1/4 of that of the soft dorsal. Caudal wedge-shaped in the young, becoming more obtuse in the adult. *Scales*—ctenoid, except on the cheeks. *Lateral-line*—curves to below the middle of the soft dorsal when it proceeds straight, the tubes have usually a single branch on either side. *Air-vessel*—with 14 or 15 lateral processes on either side, each having two or three insertions. *Colours*—silvery-gray, abdomen whitish, cheeks tinged with golden. Five broad black bands, sometimes interrupted, extend over the back, the first from the nape passes backwards and downwards, and shortly after crossing the lateral-line abruptly terminates. The second commencing opposite from the fifth to the seventh dorsal spines passes backwards and downwards,

* The species termed *Johnius maculatus*, var. by Cantor, (Catal. p. 68), is still present in the British Museum, it has been termed by Bleeker (Mém. Scién. 1874, p. 51) *J. Cantori*. I would here add to Cantor's description the following remarks from his type. Height of head equals its length excluding the snout: the distance from the eye to the upper jaw equals three-fourths of a diameter of the orbit. *Teeth*—an enlarged outer row in the upper jaw: solely villiform ones in the lower. *Fins*—longest spines of first dorsal fin one-third higher than the rays and equal to 3/5 of the height of the body. Second anal spine nearly as long as the first ray and equals the length of the postorbital portion of the head, length of the base of the anal fin equals $4\frac{1}{4}$ in that of the soft dorsal. *Scales*—ctenoid, except on the snout and below the eyes; 48 rows along the lateral line, 50 above it, and 45 below it.

terminating opposite the middle of the ventral fin. The third arising opposite the second and third dorsal rays or between the two dorsal fins passes downwards parallel to the second band. The fourth commences below the centre of the second dorsal and descends to the lateral line: the fifth taking the same course is below the last few dorsal rays: occasionally there is a sixth over the free portion of the tail. Upper two-thirds of first dorsal stained black, becoming more indistinct with age: caudal slightly tinged with black, the other fins yellowish.

Habitat.—Seas of India, attaining at least a foot in length, it is not considered good eating.

B. No enlarged inner row of teeth in the lower jaw (*Johnius*).

12. Sciæna Belengeri, Plate XLIV, fig. 5.

Sparus, Russell, Fish. Vizag. ii, p. 8, pl. cxi.
Corvina Belengeri, Cuv. and Val. v, p. 120; Günther, Catal. ii, p. 303; Day, Fish. Malabar, p. 54.
? Corvina lobata, Cuv. and Val. v, p. 122, pl. cvii; Günther, Catal. ii, p. 304; Day, Fish. Malabar, p. 55.
Corvina Kuhlii, Cuv. and Val. v, p. 121: Bleeker, Sciæn. p. 18, and Enum. Pisc. p. 35.
Johnius Belengeri, Cantor, Catal. p. 65; Kner, Novara Fische, p. 133; Bleeker, Mémoire Sciénoid. 1874, p. 46.
Tooroo kattelee, Tam.

B. vii, D. 9 | $\frac{1}{27-32}$, P. 17, V. 1/5, A. $\frac{2}{7}$, C. 17, L. l. $\frac{55}{\frac{52}{45-50}}$, L. tr. 6/14, Cæc. pyl. 5.

Length of head $4\frac{1}{3}$ to $4\frac{1}{2}$, of caudal $5\frac{1}{2}$, height of body 1/4 to $4\frac{1}{2}$ in the total length. *Eyes*—diameter $3\frac{1}{2}$ to $3\frac{3}{4}$ in the length of head, nearly 1 diameter from end of snout, and 1 apart. Height of head equals its length without the snout or behind front nostril, and its thickness equals from $1\frac{1}{2}$ to $1\frac{2}{3}$ in its length. Snout rounded, overhanging the upper jaw which last is in advance of the lower. The maxilla reaches to below the middle of the eye: cleft of mouth almost horizontal. Preopercle serrated, most coarsely so at its angle and along its horizontal limb: two opercular spines. The distance between the eye and the upper edge of the maxilla equals 1 diameter of the orbit. Snout with three open pores across its base: the free edge of the skin has one central and a second opening on either side dividing it into four lobes: five rather small open pores on the lower jaw. *Teeth*—villiform in both jaws with an outer row of enlarged and curved ones in the upper. *Fins*—dorsal fin having as a rule only 9 spines, the first of which is very short: the second and third equal from 2/3 to 1/2 the height of the body, and are 1/3 higher than the rays. Pectoral as long as the head excluding the snout. Ventral reaches half way to the anal, its outer ray prolonged. Second anal spine from a little above 1/2 to 2/3 the height of the first ray, and from $2\frac{1}{4}$ to 2/5 of that of the body: length of base of the fin equal to 1/4 of that of the soft dorsal. Caudal wedge-shaped. *Scales*—ctenoid except on snout and below the eyes where they are cycloid: they form a thick covering for the base of the soft dorsal fin. *Lateral-line*—curves to opposite the end of anal where it becomes straight, at first it is indistinct: the tubes with one or two branches. *Air-vessel*—"each side has ten branching processes, shorter, however, and apparently placed at a greater distance from each other than in *J. Dussumieri*. The three posterior pairs are much longer than the preceding, the eighth and ninth bipartite, the tenth pair is undivided, pointed."—(Cantor.) *Colours*—dark-gray, dorsals, anal, and caudal almost black: a dark blotch on the opercle: some specimens are much lighter. I have also a specimen $5\frac{1}{4}$ inches long marked as in *S. lobata*.

Out of 16 specimens from the coasts of India I find none with more than 9 dorsal spines. Kner gives 8 cæcal appendages, which are also said to exist in *S. lobata*, C. V., but I have never found above five in this species.

Habitat.—Seas of India to the Malay Archipelago and beyond: is much more common on the Western coast of India than in the Bay of Bengal. The specimen figured, life-size, is from Bombay.

13. Sciæna semiluctuosa.

Corvina semiluctuosa, Cuv. and Val. v, p. 97, p. 106; Jerdon, M. J. L. and Sc. 1851, p. 132; Günther, Catal. ii, p. 304; Day, Fish. Malabar, p. 53.
Johnius semiluctuosa, Kner, Novara Fische, p. 134.
Sukkun, Belooch.

B. vii, D. 10 | $\frac{1\frac{1}{2}}{28-31}$, P. 19, V. 1/5, A. $\frac{2}{7}$, C. 17, L. l. $\frac{85}{5\frac{5-50}{75}}$, L. tr. 8-9/25, Cæc. pyl. 7-8.

Length of head 2/7 to 1/4, of caudal 1/6 to 1/7, height of body 2/7 to 1/4 of the total length. *Eyes*—diameter $4\frac{1}{2}$ to 1/6 of length of head, 1 to 2 diameters from the end of snout, and 1 to $1\frac{1}{2}$ apart. Greatest width of head equals 4/7 of its length, the height its length without the snout. Upper profile of head rather convex: snout a little inflated. Upper jaw rather longer than the lower, the maxilla extends to below the middle of the orbit. Edge of preopercle crenulated: two blunt opercular points. Three open pores across the base of the snout, five more along the free margin of the skin, and a small lateral lobe. Five pores under the symphysis of the lower jaw. *Teeth*—villiform in either jaw, with an enlarged, curved, external row in the premaxillaries, and a few outer enlarged ones above the symphysis of the mandibles. *Fins*—dorsal spines weak, the third the longest, being 1/3 higher than the rays and equal to 3/7 of the height of the body. Pectoral as long as the head behind the middle of the eyes. Ventral reaches half way to the anal, its first ray prolonged. Second anal spine strong, nearly 3/4 as high as the first ray and equal to 3/7 of the height of the body, the length of the base of the fin equal to $4\frac{1}{2}$ in that of the soft dorsal. Caudal wedge-shaped or rounded.

Air-vessel—simple. *Cæcal appendages*—seven or eight, the longest equals about 3 diameters of the orbit. *Scales*—ctenoid except on the snout and below the eyes: the base of the soft dorsal fin thickly scaled. *Lateral-line*—tubes have short branches. *Colours*—deep gray with a blackish band running along the centre of each row of scales: head glossed with purple: fins deep black. In young specimens the lines along the rows of scales are very faint.

Habitat.—Seas of India to China, very common at Bombay along the coasts of Sind and Beloochistan. Jerdon observes, "I have only seen this species on the Malabar coast." I have never obtained it either along the Bay of Bengal: the largest specimen I found was 18 inches in length.

14. Sciæna glaucus, Plate XLVI, fig. 2.

Sciæna Dussumieri, Day, Fish. Malabar, p. 51, (not Cuv. and Val.)

B. vii, D. 10 | $\frac{1}{28-30}$, P. 16, V. 1/5, A. $\frac{2}{7}$, C. 17, L. l. $\frac{52}{50}$ $\frac{}{52}$, L. tr. 6/18.

Length of head $4\frac{1}{3}$ to $4\frac{1}{2}$, of caudal $7\frac{1}{2}$, height of body $4\frac{1}{4}$ in the total length. *Eyes*—diameter $3\frac{3}{4}$ to $4\frac{1}{4}$ in length of head, $1\frac{1}{4}$ diameters from end of snout and also apart. Greatest width of head equals half its length, the height equals its length without the snout. Snout rounded and slightly overhanging the jaws, the upper of which overlaps the lower: the upper jaw at its highest point is not on a level with the lower edge of the orbit. Distance between eye and upper jaw equals 3/4 of a diameter of the orbit. Preopercle with distinct and widely separated denticulations most developed at the angle: opercle with two spines. Shoulder-flap entire. Snout with three pores across its base, and five along its free border which has a distinct lateral lobe. Five open pores below the symphysis of the lower jaw. *Teeth*—villiform in both jaws, with an outer enlarged row of somewhat conical ones in the premaxillaries. *Fins*—dorsal spines moderately strong, the highest equal to $1\frac{2}{3}$ in the height of the body and nearly twice as high as the rays. Pectoral falciform, as long as the head excluding the snout. Ventral reaches 1/2 way to the anal, its outer ray prolonged. Second anal spine rather strong, from 1/2 to 2/3 as high as the first ray and equal from $2\frac{1}{4}$ to $2\frac{1}{2}$ in the height of the body, the extent of its base equals 2/9 that of the soft dorsal. Caudal rounded or wedge-shaped. *Scales*—cycloid on snout, cheeks, and anterior portion of the chest, ctenoid from behind the preopercle on the upper surface of the head from above the middle of the eye; 27 rows between snout and base of first dorsal fin. *Lateral-line*—becomes straight above the middle of the anal fin: tubes with one or two branches on either side. *Colours*—grayish-green along the back, becoming silvery below, a diffused bluish blotch on the opercles: a dark spot at base of pectoral, most distinct posteriorly, everywhere fine brown spots. First dorsal nearly black: upper two-thirds of second dorsal dark, due to fine spots, caudal and last half of pectoral grayish from the same cause.

This species in its proportions closely resembles *S. carutta*, but may be distinguished by wanting the light tint along the lateral line, by having a much stronger and longer second anal spine, and by most of the scales being ctenoid instead of cycloid.

Amongst my collection from the Andamans exists a species (?) having a close relationship to *S. glaucus*, and which may be a variety. It differs in that it has D. 11 | $\frac{1}{28}$, L. r. $\frac{60}{50}$. Eyes, diameter $3\frac{2}{3}$ in the length of the head, 1 diameter from the end of snout. *Scales*—cycloid on snout and below the eyes, everywhere else ctenoid. The extra dorsal spine may be an anomaly, but the character of the scales suggests a doubt if the species are the same. Curiously, I have a specimen from Orissa exactly resembling the typical *glaucus*, except that it has ctenoid scales as in the Andamanese variety.

Habitat.—Seas of India, very common at Bombay, where it attains a large size. Its air-vessel, which is similar to that of *S. sina*, is collected at the same places, and the two species have the same native names.

15. Sciæna carutta, Plate XLIV, fig. 1.

Johnius carutta, Bloch, t. 356; Cantor, Catal. p. 66; Bleeker, Sciænoides, p. 48.
Corvina carutta, Cuv. and Val. v, p. 124; Günther, Catal. ii, p. 302; Day, Fish. Malabar, p. 53.
Corvina carouna, Cuv. and Val. l. c. p. 125.

B. vii, D. 10 | $\frac{1}{25-28}$, P. 17, V. 1/5, A. $\frac{2}{7}$, C. 17, L. l. $\frac{65}{50}$ $\frac{}{55}$, L. tr. 5-6/18.

Length of head 1/4 to $4\frac{1}{3}$, of caudal 1/7, height of body 1/4 of the total length. *Eyes*—diameter 1/4 of length of head, $1\frac{1}{4}$ diameters from end of snout and also apart. Greatest width of head equals 2/3 of its length, its height equals its length excluding the snout. Snout inflated overhanging the upper jaw, which slightly overlaps the lower, the maxilla reaches to below the middle of the eye: the distance between the eye and the upper edge of the maxilla equals that of the diameter of the orbit: cleft of mouth nearly horizontal. Preopercle crenulated, more especially along its lower border: opercle with two weak spines. A row of pores across the snout: 5 along the edge of its free border, and a lateral lobe. A central pore beneath the symphysis of the mandible having two more on either side of it. *Teeth*—villiform in both jaws, a few of the outer row and in the anterior portion of the premaxillaries being enlarged, somewhat conical but scarcely curved. *Fins*—dorsal spines weak, the second and third the longest, 1/3 higher than the rays and equal to 1/2 the height of the body. Pectoral as long as the head excluding the snout. Ventral reaches half way to the vent, its outer ray elongated. Second anal spine weak, nearly 2/3 as high as the first ray, and 2/7 to 2/5 of the length of the head. Caudal rhomboidal. *Scales*—mostly cycloid, a few ctenoid at the centre of their free edge between the pectoral fin and lateral-line: the ctenoid portion of the scale is only in a little patch about the middle of its free edge. Those on the head as large as those on the body. *Lateral-line*—curves gradually until above the end of the anal fin when it becomes straight, its tubes have short branches. *Air-vessel*—with several lateral branching

attachments. *Colours*—purplish-brown due to numerous fine dots, but becoming golden in the lower fourth of the body, its lateral-line is generally lighter than the contiguous parts. Head glossed with purple. First dorsal fin dark, the others with gray edges.

Jerdon observes, M. J. L. and Sc. 1851, p. 132, that this fish is more abundant on the Malabar coast than at Madras, but I find on referring to Sir W. Elliot's drawings that he has marked one as *Corvina carutta*, and which he observes equals Russell's cxi. or *S. Belengeri.*

I have two specimens from the Malabar coast that appear to be *Corvina carouna*, Cuv. and Val. (v. p. 125). They are gray and have merely an indistinct trace of the light line along the lateral-line, so well marked in *S. carutta.* Irrespective of this however, all the scales (except those on the snout and below the eyes) are strongly ctenoid, offering a marked contrast to *carutta*, and the second anal spine is from 1/4 to $4\frac{1}{4}$ in the length of the head. Otherwise I am unable to discover any difference.

Habitat.—Seas of India to the Malay Archipelago, it attains nearly a foot in length. The specimen figured is 8 inches in length, and from Madras.

16. Sciæna osseus, Plate XLVI, fig. 3.

B. vii, D. 10 | $\frac{1}{25}$, P. 18, V. 1/5. A. $\frac{2}{7}$, C. 17, L. l. $\frac{55}{\frac{50}{45}}$ L. tr. 6/15.

Length of head $4\frac{1}{4}$, of caudal 1/6, height of body $4\frac{1}{4}$ in the total length. *Eyes*—diameter 1/5 of length of head, $1\frac{1}{4}$ diameters from end of snout, and $1\frac{1}{2}$ apart. The greatest width of the head equals its post-orbital length; its height equals its length behind the front nostril. Snout obtuse, not inflated, the dorsal profile above the eyes is a little concave: cleft of mouth oblique, the anterior extremity of the lower jaw being on a level with the lower edge of the eye. The maxilla reaches to below the hind edge of the orbit; the upper jaw scarcely overlaps the lower. The distance from the eye to the upper jaw nearly equals one diameter of the orbit. Preopercle rather strongly denticulated in its whole extent. Two opercular spines. Shoulder-flap serrated. Three small pores across the snout, and five along the free edge of the skin but no lateral lobe. Two small central pores below the symphysis of the lower jaw and two more large ones laterally and posteriorly. *Teeth*—villiform in both jaws with an outer enlarged row in the premaxillaries. *Fins*—first dorsal spine very short, the second and third of equal length, the fourth the longest but only slightly higher than the posterior rays, and $2\frac{1}{4}$ in that of the body. Pectoral as long as the head behind the middle of the eyes. Ventral reaches half way to the vent. Second anal spine weak, about 1/2 as long as the first ray and equal to 1/4 of the length of the head. Caudal wedge-shaped. *Scales*—cycloid on head and chest, ctenoid on the body. *Lateral-line*—forms a well marked curve to above the front edge of the anal fin: tubes very distinct, and giving off one short branch on either side. *Colours*—brownish-gray or stone-coloured along the back, becoming dull white on the sides and below. Opercle bluish-black. First dorsal black in its upper half, outer edges of pectoral, ventral, anal, and caudal gray.

Habitat.—Malabar coast of India, from whence the specimen figured (7 inches long) was procured.

Genus, 3—SCIÆNOIDES,* *Blyth* (January, 1860).

Bola, pt. Ham. Buch.; *Sciæna*, sp. Cuv. and Val.; *Collichthys*, Günther (June, 1860); *Hemisciæna*, Bleeker; *Plagioscion*, Gill.

Branchiostegals seven: pseudobranchiæ. Eyes small. Head broad, with its upper surface very convex. Cleft of mouth oblique and deep. Teeth villiform in the upper jaw, with an outer distantly placed row of curved conical ones in the premaxillaries, becoming canine-like anteriorly: an inner row enlarged and conical in the lower jaw, with an outer series of villiform ones. No barbels. Two dorsal fins, united at their bases, the second with many rays: two weak anal spines: caudal wedge-shaped. Scales small, cycloid or ctenoid. Air-vessel generally having a horn-like process on either side, and with many lateral appendages. Pyloric appendages few or in moderate numbers.

Uses.—Good as food, its air-vessel used for isinglass.

Habitat.—Seas of India to the Malay Archipelago and beyond.

SYNOPSIS OF SPECIES.

1. *Sciænoides pama*, D. 10 | $\frac{1}{40-43}$, A. $\frac{2}{7}$, L. l. $\frac{90}{85}$, Cæc. pyl. 9. Brownish superiorly, light below: fins edged with gray. Bay of Bengal, entering estuaries and rivers.
2. *Sciænoides microdon*, D. 8-9 | $\frac{1}{37}$, A. $\frac{2}{7}$, L. l. $\frac{95}{85}$, Cæc. pyl. 6. Brownish superiorly, becoming light beneath. Seas of India to the Malay Archipelago.
3. *Sciænoides biauritus*, D. 9 | $\frac{1}{27-33}$, A. $\frac{2}{7}$, L. l. $\frac{115}{95}$, Cæc. pyl. 13. Brownish superiorly, golden below. Estuaries of India to the Malay Archipelago and China.
4. *Sciænoides brunneus*, D. 9 | $\frac{1}{27-28}$, A. $\frac{2}{7}$, L. l. $\frac{130}{130}$. Gray, with blackish fins. Bombay.

1. Sciænoides pama.

Bola pama, Ham. Buch. Fish. Ganges, pp. 79, 368, pl. 32, fig. 26.

* Blyth gives as the species forming his Genus, 1. *Sciænoides biauritus*: 2. *Sc. pama*: 3. *Sc. Hardwickii*=*S. pama*, young: 4. *Sc.* (?) *asper.*

Sciæna pama, Cuv. and Val. v, p. 55, pl. 101; Bleeker, Verh. Bat. Gen. xxv, p. 92.
Sciænoides pama, Blyth, Proc. Asia. Soc. Beng. 1860, p. 139.
Collichthys pama, Günther, Catal. ii, p. 316.
Sciænoides Hardwickii, Blyth, J. A. S. of Beng. 1860, p. 139 (*young*).
Ven begti, Ooriah and Hind.: *Coii bola*, Bengali: *Botul*, Ooriah: *Nga-pouss-was*, Mugh.

B. vii, D. 10 | $\frac{1}{40-43}$, P. 17, V. 1/5, A. $\frac{2}{7}$, C. 17, L. l. $\frac{90}{\frac{55}{65}}$, L. tr. 9/25, Vert. 24, Cæc. pyl. 9.

Length of head $4\frac{1}{3}$ to $4\frac{2}{3}$, of caudal $5\frac{1}{2}$, height of body 1/5 to 1/6 of the total length.* *Eyes*—diameter 1/7 to 1/8 of the length of head, 2 diameters from end of snout, and from $2\frac{1}{2}$ to 3 apart. Greatest width of the head equals $1\frac{3}{4}$ of its length: its height equals its length excluding the snout. Snout not much swollen. Cleft of mouth oblique, the maxilla reaching to below or even behind the hind edge of the orbit: lower jaw slightly the shorter. The distance between the eye and the maxilla equals about $1\frac{1}{2}$ diameters of the orbit. Preopercle crenulated, with denticulations at its angle most distinct in the young: opercle with two points. Snout with two open pores on its anterior surface, and two more opening on the free edge of the skin: lower jaw with a small open pore a little below and to one side of the symphysis. Shoulder-flap having its edge with numerous long ciliæ. *Teeth*—villiform in the upper jaw, with an outer row of large, distantly placed, curved, and conical ones, largest near the symphysis. An inner row of widely placed, conical teeth in the lower jaw, with an outer villiform series. *Fins*—dorsal spines weak, with filamentous terminations, the third and fourth the longest and equal to $2\frac{1}{4}$ in the height of the body, and nearly twice as long as the rays. Pectoral pointed and as long as the head. Ventral reaches half way to the vent. Second anal spine weak, 1/3 to 2/7 of the length of the rays and equal to 1 diameter of the orbit: length of the base of the fin equal to 1/8 of that of the soft dorsal. Caudal wedge-shaped, its central rays much the longest. *Scales*—cycloid on the head, ctenoid on the body. *Lateral-line*—on a raised row of scales, becomes straight above the middle of the anal fin, its tubes being very arborescent posteriorly. *Air-vessel*—dividing anteriorly into two short processes, whilst springing from near its posterior extremity are two more long processes which extend anteriorly as far as the auditory apparatus. *Colours*—light brownish along the back, becoming white beneath: head shot with gold and purple. Fins yellowish, the upper half of the dorsal gray, as is also the last half of the caudal.

It is termed '*whiting*' in Calcutta, and is light and wholesome if cooked whilst fresh, but it rapidly becomes soft and tasteless after death.

Habitat.—Bay of Bengal, entering estuaries and rivers as far as the tide extends, it attains at least 5 feet in length.

2. Sciænoides microdon, Plate XLV, fig. 2.

Otolithus microdon, Bleeker, Madura, p. 10, Sciæn. p. 16, Java, p. 99.
Sciæna microdon, Günther, Catal. ii, p. 294.
Collichthys microdon, Bleeker, Mém. Scién. 1874, p. 16.

B. vii, D. 8-9 | $\frac{1}{34-37}$, P. 19, V. 1/5, A. $\frac{2}{7}$, C. 18, L. l. $\frac{95}{85}$, L. tr. 11/20, Cæc. pyl. 6.

Length of head 1/4, of caudal 2/9, height of body 2/11 of the total length. *Eyes*—diameter 1/6 of length of head, $1\frac{1}{4}$ diameters from end of snout, and $2\frac{1}{4}$ apart. The greatest width of head equals half to 2/3 its length, its height equals its length excluding the snout. Snout not overhanging the jaws, the lower slightly prominent opposite the symphysis. Cleft of mouth oblique, the maxilla at its anterior extremity on a level with the middle of the eye, posteriorly it reaches to below the hind edge of the orbit. Edges of the preopercle finely serrated: an opercular spine. Three open pores along the free edge of the skin at the snout, but no lateral lobe. Four large open pores along the under side of the lower jaw near the symphysis. *Teeth*—villiform in both jaws, an outer row of distantly placed, curved, conical ones in the premaxillaries: an inner row of widely separated conical ones in the lower jaw, and an outer villiform series. *Fins*—dorsal spines increase in length from the third to the fifth which are 1/4 higher than the rays and equal to 1/2 the height of the body. Pectoral equals the length of the head excluding the snout. Ventral reaches half way to the anal. Second anal spine equals half the height of the rays. Caudal wedge-shaped. *Scales*—cycloid in the young, ctenoid on the body, in larger specimens especially below the lateral-line. *Lateral-line*—curves to opposite the commencement of the anal fin. *Colours*—brown, becoming lighter on the sides and beneath. Fins yellow, dorsal and anal tipped with blackish.

Habitat.—The specimen which is figured life-size came from Bombay. If it is identical with Bleeker's species it is also found in the Malay Archipelago. A larger specimen (9 inches) from Orissa was a female, with the air-vessel as in *S. biauritus*.

3. Sciænoides biauritus, Plate XLVII, fig. 1.

Otolithus biauritus, Cantor, Catal. p. 57; Bleeker, Borneo, p. 3.
Sciænoides biauritus, Blyth, J. A. S. of Beng. 1860, p. 139.
Collichthys biauritus, Günther, Catal. ii, p. 315, and Zool. Record, iii, p. 143; Bleeker, Mém. Scién. 1874, p. 15.

B. vii, D. 9 | $\frac{1}{27-33}$, P. 19, V. 1/5, A. $\frac{2}{7}$, C. 17, L. l. $\frac{115}{95}$, L. tr. 12/25, Cæc. pyl. 13.

* The fry do not appear at all like the adult. I took a number in the Sunderbunds, and at $2\frac{1}{2}$ inches in length the height of the body is only 1/4 to 2/9 of that of the total, the preopercle is strongly denticulated, with 2 or 3 spines at its angle.

Length of head 1/4 to $4\frac{1}{3}$, of caudal 1/6, height of body 1/5 to 1/6 of the total length. *Eyes*—diameter 1/7 to 1/8 of length of head, 2 diameters from end of snout, and also apart. The greatest width of the head equals half its length, height of head equals its length excluding the snout. Cleft of mouth oblique, the anterior extremity of the upper jaw being on a level with the lower edge of the orbit: the maxilla reaches to below the last third or hind edge of the eye: upper jaw overlaps the lower. The distance from the eye to the upper jaw equals the diameter of the orbit. Posterior limb of preopercle oblique, and indistinctly crenulated along its vertical border: two opercular points. Five open pores along the free edge of the skin of the snout, no lateral lobe: four small open pores on the under surface of the lower jaw. Shoulder-flap fimbriated. *Teeth*—villiform in the upper jaw, with an outer row of distantly placed, curved, conical ones in the premaxillaries: an inner row of conical teeth in the lower jaw, with a few villiform ones externally. *Fins*—dorsal spines weak, and as high as the posterior rays of the soft dorsal fin, the highest equalling about 2/5 in that of the body. Pectoral equals the head behind the middle of the eyes. Ventral reaches half way to the anal. Second anal spine weak, half as long as the rays and equal to 1/4 of the length of the head: the length of the base of the fin is from $5\frac{1}{2}$ to 1/6 of that of the soft dorsal. Caudal wedge-shaped. *Scales*—cycloid, except on the body below the lateral-line where they are feebly ctenoid. *Lateral-line*—on a row of thin scales, becoming straight above the front edge of the anal fin: tubes well developed. *Air-vessel*—with 25 lateral processes, and a single long projection on either side from the anterior extremity reaching to the posterior end of the air-vessel. *Colours*—of a light brownish superiorly, tinged with gold on the abdomen, head shot with purple.

Habitat.—Seas and estuaries of India to the Malay Archipelago and China. The longest specimen in the Calcutta Museum is 42 inches.

4. **Sciænoides brunneus,** Plate XLV, fig. 6.

Otolithus brunneus, Day, Journal Linn. Soc. 1873, p. 524.

B. vii, D. 9 | $\frac{1}{27-28}$, P. 18, V. 1/5, A. $\frac{2}{7}$, C. 17, L. l. $\frac{130}{\frac{102}{130}}$, L. tr. 21/34.

Length of head 1/4 to 2/9, of caudal 2/11 to 1/6, height of body 2/11 to 1/6 of the total length. *Eyes*—diameter 1/7 to 1/8 of length of head, $1\frac{1}{2}$ diameters from end of snout, and 2 apart. Width of the head equals half its length, its height equals 3/5 of its length. The jaws of about equal length, or the lower slightly the shorter. Cleft of mouth somewhat oblique, the maxilla reaches to below the hind edge of the eye. Preopercle with a few widely separated serrations, most apparent at its rounded angle. Opercle with two obtuse points. No open glands on snout: two badly marked pores on the front of the lower jaw below the symphysis. Shoulder-lobe finely fimbriated along its free edge. *Teeth*—an outer row of curved conical teeth in the upper jaw, having about two villiform rows internally, a small curved canine on either side of the centre of the upper jaw: an outer villiform row and an inner single row of irregularly sized and rather distantly placed conical teeth laterally in the lower jaw, with a small canine-like one on either side of the symphysis, having a few villiform ones posteriorly, a few small teeth are present external to the enlarged row. *Fins*—dorsal spines weak and having filamentous terminations, the third to the sixth of somewhat the same length, and equal to about $2\frac{1}{4}$ in the height of the body. Second dorsal highest in its last third, where it equals or exceeds that of the spinous dorsal. Pectoral as long as the head posterior to the middle of the eye: ventral only reaches one-third of the distance to the vent. Anal spines weak and short, 1/3 of length of rays, the length of the base of the fin equal to $5\frac{1}{2}$ or 1/6 of that of the soft dorsal. Caudal pointed. *Scales*—rather oval, cycloid, and transversely elongated on the head, ctenoid and vertically elongated on the body: a few very fine ones over the bases of the soft dorsal and anal fins. *Lateral-line*—gently curves to below the first fourth of the second dorsal, where it becomes straight. *Colours*—brownish, becoming golden below: fins darkest externally.

A specimen of this fish in the Berlin Museum is marked as having been received from Valenciennes, marked *Sciæna pama*, Bombay, with it was also sent the *Sciænoides pama* from the Ganges, having the same designation.

Habitat.—Bombay, where it is common in October, it attains at least 18 inches in length, the specimen figured is 11 inches long.

Genus, 4—Otolithus, *Cuv.*

Cynoscion, *Anomiolepis*, *Apseudobranchus*, *Archoscion* and *Atractoscion*, Gill.

Branchiostegals seven: pseudobranchiæ. Body oblong. Eyes of moderate size. Snout a little pointed, the lower jaw being the longer. Preopercle crenulated, serrated, or denticulated. No barbels. Villiform teeth in both jaws with the outer row in premaxillaries enlarged: well developed conical canines in both jaws or merely in the upper,† they are usually received, when the mouth is closed, into fossæ in the opposite jaw. A single row of widely separated conical teeth in the lower jaw with occasionally a single outer row of villiform ones. Two dorsal fins united at their bases, the first with nine or ten weak spines: anal with one or two small ones, and few rays* (6-11). *Scales ctenoid or cycloid, and of moderate or small size. Air-vessel present, mostly with lateral appendages. Pyloric appendages few.*

Uses.—Employed as food: its air-vessels collected for isinglass.

* As a rule in the fry of Indian species the preopercle is denticulated or spinate.

† *Cynoscion*, Gill.

Habitat.—Seas of India, the Malay Archipelago and beyond; residents in most tropical seas, some are said to be found in fresh water. In India they are rarely if ever taken above tidal reach.

SYNOPSIS OF SPECIES.

1. *Otolithus maculatus*, D. 9-10 | $\frac{1}{30}$, A. $\frac{2}{10-11}$, L. l. $\frac{95}{85}$. Large canines in both jaws. Grayish, five or six rows of black spots along the body and caudal fin. Seas of India to the Malay Archipelago.

2. *Otolithus ruber*, D. 10 | $\frac{1}{29-31}$, A. $\frac{2}{7}$, L. l. $\frac{65}{54}$. Width of head $2\frac{1}{4}$ in its length. Large canines in both jaws. Brownish-red shot with silver. Seas of India to the Malay Archipelago.

3. *Otolithus argenteus*, D. 10 | $\frac{1}{28-30}$, A. $\frac{2}{7}$, L. l. $\frac{80}{75}$. Width of head equals $1\frac{3}{4}$ to 1/2 its length. Large canines in both jaws. Silvery, four narrow gray longitudinal bands along the sides. Seas of India to the Malay Archipelago.

1. Otolithus maculatus, Plate XLVI, fig. 4.

Cuv. Règn. Anim. Poiss. t. xxvii, f. 2; Cuv. and Val. v, p. 64; Cantor, Catal. p. 62; Blyth, J. A. S. of Beng. 1860, p. 140; Bleeker, Sciæn. p. 15, and Mémoire Scién. 1874, p. 12; Günther, Catal. ii, p. 310; Day, P. Z. S. 1865, p. 300.

? *Otolithus bispinosus*, Cuv. and Val. v, p. 65; Blyth, J. A, S. of Beng. 1860, p. 141; Günther, Catal. ii, p. 310 *(? young)*.

Birralli, Ooriah.

B. vii, D. 9-10 | $\frac{1}{30}$, P. 18, V. 1/5, A. $\frac{2}{10-11}$, C. 17, L. l. $\frac{95}{85}$, L. tr. 14/26.

Length of head $3\frac{1}{2}$ to $4\frac{1}{4}$, of caudal 1/8, height of body $5\frac{1}{2}$ to one-sixth in the total length. *Eyes*—diameter 1/6 to 1/7 of length of head, $1\frac{1}{4}$ diameters from end of snout, and $1\frac{1}{2}$ apart. Greatest width of head equals from $1\frac{3}{4}$ to 2 in its length, its height equals its length behind the middle of the eye. Cleft of mouth oblique, lower jaw the longer, the maxilla reaches to below the last third or hind edge of the eye. Edge of preopercle more crenulated than denticulated (spinate in the young): opercle with two weak points. Skin of snout with three small open orifices along its free border but no lateral lobe. No open pores visible below lower jaw. Shoulder-flap crenulated. *Teeth*—a long strong canine on either side of the symphysis of the lower jaw, and on either side of the upper just external to those in the mandibles: a row of widely separated conical and pointed teeth along the sides of the lower jaw: and villiform teeth in the upper with an external row of conical and curved ones. *Fins*—dorsal spines weak with filamentous terminations, they increase in length to about the fifth which equals 2/3 of the height of the body and is a third higher than the rays. Pectoral equals the height of the head. Ventral reaches about one-third of the distance to the anal. Second anal spines weak, 1/2 the height of the first ray, and 1/4 of that of the body: length of the base of the anal fin equals 1/3 of that of the soft dorsal. Caudal wedge-shaped or rounded. *Scales*—cycloid, and in very irregular rows. *Lateral-line*—becomes straight above the middle of the anal fin. *Air-vessel*—with about 54 lateral appendages on either side. *Colours*—grayish in the upper part of the body, golden below: five or six rows of black spots along the body and caudal fin: the other fins stained with gray at their edges.

Some fry, apparently of this species, which I captured in the Sunderbunds, March 1874, had the body gray, fins black except the tail which was white.

Habitat.—Seas of India to the Malay Archipelago, attaining at least 16 inches in length. It is very common in the sea and estuaries of Orissa and lower Bengal.

2. Otolithus ruber.

Johnius ruber, Bl. Schn. p. 75, t. xvii.

Otolithus ruber, Cuv. and Val. v. p. 60, pl. 102; Swainson, Fishes, ii, p. 219; Cantor, Catal. p. 59; Jerdon, M. J. L. and Sc. 1851, p. 131; Günther, Catal. ii, p. 309; Day, Fish. Malabar, p. 57; Bleeker, Mémoire Scién. 1874, p. 11.

Otolithus submaculatus, Blyth, J. A. S. of Beng. 1860, p. 141.

B. vii, D. 10 | $\frac{1}{29-31}$, P. 17, V. 1/5, A. $\frac{1-2}{7}$, C. 17, L. l. $\frac{60-65}{52-54}$, L. tr. 7/17, Cæc. pyl. 4-5.

Length of head 1/4 to 2/7, of caudal 1/6 to 2/13, height of body 1/4 to $5\frac{1}{2}$ in the total length. *Eyes*—diameter 1/4 to 1/5 or even 1/6 of length of head, nearly 1 diameter from end of snout, and $1\frac{1}{4}$ apart. Greatest width of head equals $2\frac{1}{4}$ in its length, and its height its length excluding the snout. Cleft of mouth rather oblique, the maxilla reaches to below the last third of the eye: nostrils opposite the upper third of the orbit. Preopercle scarcely denticulated: two opercular spines. Shoulder-flap entire. The distance between the eye and the upper jaw equals two-thirds of the diameter of the eye in extent. *Teeth*—on either side of the symphysis of the upper jaw a pair of large canines, and an inner villiform band, also an outer row of conically curved ones, occasionally even between the canines: in the lower jaw a central (sometimes a second) curved canine having a few villiform teeth behind it, and a lateral row of distantly placed conical teeth. *Fins*—dorsal spines slender, the second and third equalling from 2 to $2\frac{1}{4}$ times in the height of the body, and from 1/2 to 2/3 higher than the rays. Pectoral as long as the head excluding the snout. The ventral does not reach quite half way to the vent. First anal spine minute or wanting, the length of the second equals about 2/5 of that of the first ray, the length of the base of the anal fin about 1/6 in that of the soft dorsal. Caudal wedge-shaped. *Scales*—cycloid. *Lateral-line*—gradually curves to above the middle or end of the anal: the tubes arborescent

posteriorly. *Air-vessel*—somewhat contracted at its first fourth and having about 34 branching processes on either side. *Colours*—brownish-red, shot with silvery and white, sometimes glossed with gold in the lower third of the body. First dorsal stained black at its edge, soft dorsal and anal with grayish outer margins: pectoral, ventral, and anal yellow.

Having sent an air-vessel of this species to Mr. Broughton, the Government chemist, he observed that "it contains about 80 per cent of gelatine, isinglass containing about 90 per cent. It will set a jelly with about 26 times its weight of water."

Habitat.—Seas of India to the Malay Archipelago, attaining $2\frac{1}{2}$ feet or more in length: it is the commonest form in the Indian seas, especially along the Coromandel coast. It is pretty good for the table. The ova appears to be deposited from about March to July.

3. **Otolithus argenteus**, Plate XLV, fig. 3.

(Kuhl. and v. Hass.) Cuv. and Val. v, p. 62; Richards. Ich. China, p. 225; Bleeker, Sciæn. p. 15, and Mémoire Sciénoides, 1874, p. 9; Cantor, Catal. p. 61; Günther, Catal. ii, p. 310; Day, Fish. Malabar, p. 58; Kner, Novara Fisch. p. 135, t. vi, f. 4 (air-vessel.)

Bu-ru, Sind.: *Golaree*, Tel. (at Gopalpore.)

B. vii, D. 10 | $\frac{1}{28-30}$, P. 16, V. 1/5, A. $\frac{2}{7}$, C. 17, L. l. $\frac{70-80}{\frac{54}{70-75}}$, L. tr. 7-8/21, Cæc. pyl. 6.

Length of head $3\frac{3}{4}$ to $4\frac{1}{4}$, of caudal $6\frac{1}{2}$ to 1/7, height of body $4\frac{1}{2}$ to 1/5 of the total length. *Eyes*—diameter 2/9 to 1/4 of length of head, 1 to $1\frac{1}{8}$ diameters from end of snout, and $1\frac{1}{4}$ apart. Greatest width of head equals from $1\frac{3}{4}$ to 1/2 its length: its height its length excluding the snout. Interorbital space almost flat. Cleft of mouth oblique: lower jaw the longer: the maxilla reaches to below the middle of the eye: the distance between the eye and the maxilla equals half a diameter of the orbit. Vertical limb of preopercle slightly serrated (in the young it is spinate): its angle and lower edge crenulated: two opercular spines. Free edge of skin across snout entire having an open pore above the vertical from the canine teeth: no open glands on the lower jaw. Edge of shoulder-flap serrated. *Teeth*—a villiform internal series in the upper jaw, two large pointed canines to the side of the symphysis. A single large central canine in the lower jaw and a lateral row of conical teeth: in some specimens there exists a few villiform teeth external to this row. *Fins*—dorsal spines increase in length to the third and fourth which equal half the height of the body, and are 1/3 higher than the rays. Pectoral as long as the head excluding the snout. Ventral reaches half way to the anal. Second anal spine weak, rather more ($2\frac{3}{4}$) than one-third the height of the first ray, and 3/4 of the diameter of the orbit: the base of the fin equals 1/5 of that of the soft dorsal. Caudal wedge-shaped. *Scales*—cycloid, except in the last half of the body in its lower half where they are more or less ctenoid, some over bases of caudal and anal fins. *Lateral-line*—tubes strongly arborescent posteriorly. *Air-vessel*—with 25 lateral processes on either side. *Colours*—silvery, darkest along the back: four dark longitudinal bands along the sides, one being along the lower edge of the dorsal fin, a second at 1/3 the distance between it and the lateral-line, the two others on either side of the lateral-line. A darkish spot on the opercle. Pectoral, ventral, and anal orange, outer edge of dorsal grayish.

Russell (Fish. Vizag. ii, p. 7, pl. 109) published the figure of what he termed a *Sparus?* Called by the natives *Pottee kanasah*, having D. 10/$\frac{1}{21}$, it he observed attained one foot two inches in length and its breadth was 1/4 of its length. Cuv. and Val. (v, p. 64) named the species *Otolithus versicolor*, and Cantor (Catal. p. 63) considered that he recognised it in a species from Pinang which has D. 10 | $\frac{1}{25}$, and has been called by Bleeker, *Otolithus lateoides* (Java, p. 98, Sciæn. p. 16, and Mém. Scién. 1874, p. 7.)

Having searched very many times for this fish on the Coromandel coast and always without any result, it has appeared to me that it may represent *O. argenteus*, which is very common at Vizagapatam: but on the other hand there is Cantor's specimen, and Bleeker's species from the Malay Archipelago, and which may still be found in the Bay of Bengal. It has D. 10 | $\frac{1}{24-26}$, P. 17, V. 1/5, A. $\frac{2}{7}$, C. 17, L. l. $\frac{100}{90}$, L. tr. 11/. Length of head 1/5, height of body 5 to $5\frac{1}{2}$ in the total length. *Eyes*—diameter $4\frac{2}{3}$ to 1/6 in the length of head, and 1 to $1\frac{1}{4}$ apart, &c.

Habitat.—The *O. argenteus* inhabits the seas of India to the Malay Archipelago and China, attaining upwards of $2\frac{1}{2}$ feet in length. The specimen figured is 8 inches long, and from Orissa.

Family, XIII—XIPHIIDÆ, *Agass.*

Sword-fish.

Branchiostegals seven: pseudobranchiæ. Eyes lateral. Body compressed, the upper jaws (comprising ethmoid, vomer, and premaxillaries) produced into a long, sword-shaped process: cleft of mouth deep. Teeth absent or rudimentary. One or two dorsal fins, without any distinct spinous portion: ventrals when present, thoracic and rudimentary. Scales absent or in the form of rudimentary dermal productions. Air-vessel present. Pyloric appendages, when present, numerous.

The sword-fishes are well known to occasionally attack vessels in the Indian Ocean. "The ship, Royal George of about 500 tons, experienced the dreadful hurricane in the Bay of Bengal. So furious was the tempest that in addition to the loss of the main and mizzen masts the bowsprit was found broken off just outside the head of the stern, its diameter was 23 inches: and on looking at the bottom, the snout or horn of an unicorn fish was discovered projecting beyond the surface about 6 inches. A similar fact was remarked and the perforated piece of wood presented to the A. S. of Bengal, as noticed in the Proceedings of December 26th, 1833."* In the *Indian Daily News* (November, 1874), it is observed: "We have been shewn by the commander of the ship *Cashmere* a piece of the sword of a sword-fish which must have attacked the ship on her course from Bombay to Calcutta. Without any apparent cause the vessel began to make water, and all attempts to discover the cause were futile, until, after the removal of a large part of the cargo, the lightened ship rose in the water and the cause was discovered. The ship had been struck by a sword-fish, and the sword had pierced the copper and the timber of the ship, and penetrated some nine or ten inches beyond, breaking off by the copper, probably from the impossibility of withdrawing it. The sword not merely pierced the ship, but split the plank for a considerable distance on each side of the point of contact. The *Cashmere* is a new ship, and the timber perfectly sound." See also a paper by Dr. J. E. Gray, (An. and Mag. 1871, viii, pp. 338, 339), "On the injury inflicted on ships by the Broad-finned sword-fish of the Indian Ocean."

"The young of *Xiphias*, has a very long *Belone*-like beak; the supraorbital edge with conical prominences, no occipital spine, and with two short pointed teeth at the angle of the preopercle. The young of *Histiophorus* has the jaws comparatively shorter, the supraorbital edge very finely or not denticulated, a bony spine on each side of the occiput and at the angle of the preopercle."—Günther, Zool. Record, 1873, p. 110.

Habitat.—From the Mediterranean throughout the tropical seas.

SYNOPSIS OF GENERA.

1. *Histiophorus.* Ventral fins present. Seas between the tropics, also in the Mediterranean.
2. *Xiphias.* Destitute of ventral fins. Not as yet been found in the seas of India.

Genus, 1—Histiophorus, *Lacép.*

Notistium, Herm.: *Tetrapturus*, (Rafin.) Cuv. and Val.: *Zanclurus*, Swains.

Branchiostegals, seven: pseudobranchiæ. Body elongated. Upper jaw conical, much prolonged, and considerably longer than the lower. Minute teeth on the jaws and palatines: vomer edentulous. Two dorsal and two anal fins, the anterior of each of which is the longer: ventrals in the form of one, two, or even three rays. Scales absent, rudimentary dermal productions may be present. Air-vessel present. Pyloric appendages, when present, numerous.

The height of the dorsal fin, in comparison with that of the body, appears to be much more considerable in the young than in the adult.

SYNOPSIS OF SPECIES.

1. *Histiophorus gladius.* D. 40-50/7, A. 10/7. Dorsal fin much higher than the body. Dorsal fin covered with brilliant blue spots. Tropical seas or their vicinity.
2. *Histiophorus immaculatus.* D. 47/7, A. 10-11/7. Dorsal fin much higher than the body. Gray, dorsal blackish. Red Sea, and seas of India.
3. *Histiophorus brevirostris.* D. 35/7, A. 11/7. Dorsal fin not so high as the body. Gray, dorsal and pectoral tipped with black. Seas of India.

1. Histiophorus gladius.

Scomber gladius, Brouss. Mém. Acad. Sc. 1786, p. 454, pl. x; Bloch, t. 345.
Xiphias velifer, Bl. Schn. p. 93.
Istiophorus gladius, Lacép. iii, pp. 374, 375.
Xiphias ensis, Lacép. ii, p. 296.

* Proc. As. Soc. of Bengal, iv, p. 411.

Xiphias platypterus, Shaw, Zool. iv, p. 101.
Histiophorus Indicus, Cuv. Règ. Anim. Ill. Poiss. pl. 53, f. 1; Cuv. and Val. viii, p. 293, pl. 229; Jerdon, M. J. L. and Sc. 1851, p. 139.
Histiophorus Americanus, Cuv. and Val. viii, p. 303; Guichen, Cuba, p. 105.
Histiophorus gladius, Günther, Catal. ii, p. 513; Playfair, P. Z. S. 1867, p. 856.
Myl-meen, Tam. 'Peacock Fish.'

B. vii, D. 40-50/7, P. 15, V. 1-2, A. 10/7, C. 17, Vert. 14/10.

Length of entire head 1/4, height of body 1/7 to 1/8 of the total length. *Eyes*—a very abrupt ascent in the upper profile of the head. Snout produced and longer than the remainder of the head. *Teeth*—generic. *Fins*—dorsal fin commences on the nape and is much higher to twice as high as the body in its first portion, but becomes lower posteriorly, and considerably raised above its centre in young specimens. Pectoral equal to 1/6 or 1/7 of the total length. First anal commences under the last fourth of the first dorsal fin: the second, smaller, is below the second dorsal and similar to it. *Scales*—dermal productions lanceolate. Stomach elongated, intestines very short not exceeding the length of the fish. *Air-vessel*—in the last third of the abdominal cavity, consisting of two distinct lateral portions, each of which are subdivided internally into numerous cavities. *Cæcal-appendages*—absent (Ehrenberg found them innumerable). *Colours*—body bluish-gray, becoming dull white underneath. Dorsal fin of a bright Prussian-blue with darker spots: other fins dusky.

Habitat.—Tropical seas or their vicinity. I procured one 9 feet long at Madras, February 15, 1867, its stomach contained a full-sized *Scomber kanagurta*, two large *Hemiramphi* and numerous small fish. Common in the cold season off Madras, arriving about October and continuing until March.

2. Histiophorus immaculatus.

Rüpp. Proc. Zool. Soc. iii, p. 116, Trans. Zool. Soc. ii, p. 71, pl. xv, and N. W. Fische, p. 42, t. xi, f. 3; Günther, Catal. ii, p. 514.
Yemungolah, Tamil.

B. vii, D. 47/7, P. 16, V. 3, A. 10-11/7, C. 17.

Length of head (including the snout) 1/3, height of body 1/10 of the total length. *Eyes*—diameter about 1/3 in the postorbital portion of the head. A very slight ascent from the snout to the base of the first dorsal fin. The maxilla reaches to below the hind edge of the orbit. *Teeth*—generic. *Fins*—length of base of dorsal fin about 1/3 of the total length, eleventh to the fifteenth dorsal ray the longest, and at least three times higher than the body: the last few rays are low and reach to the base of the second dorsal fin. Ventral elongated. *Scales*—dermal productions lanceolate. *Lateral-line*—at first makes a very strong curve, but becomes straight above the hind extremity of the pectoral fin. *Colours*—gray, dorsal and ventral blackish.

Habitat.—Red Sea, and seas of India. A specimen in the Madras Museum is 5 feet 9 inches in length.

3. Histiophorus brevirostris, Plate XLVII, fig. 3.

? *Tetrapturus Indicus*, Cuv. and Val. viii, p. 286.
? *Histiophorus brevirostris*, Playfair, Fish. Zanz. pp. 53, 145. c. fig.
? *Histiophorus*, Knox, Trans. New Zealand Inst. ii, 1870, pp. 13-16, pl. 1.

B. vii, D. 35/7, P. 19, V. 2, A. 11/7, C. 17.

Length of head (including the snout) 3/10, of caudal lobes 1/5, entire length of upper jaw (including the snout) 2/9, height of body 1/8 of the total length. Greatest width of head equals 1/2 its depth. *Eyes*—diameter 1/3 in the postorbital portion of the head; a very slight ascent from the snout to the base of the first dorsal fin. Snout produced, its length, beyond the anterior extremity of the lower jaw, rather above 1/3 of that of the head. The maxilla reaches to rather behind the hind edge of the orbit. *Teeth*—generic. *Fins*—first dorsal highest anteriorly where it nearly equals that of the body, the posterior rays from about the fifth are not quite 1/3 of the height of the anterior: second dorsal with its last ray prolonged. Pectoral as long as the head behind the front nostril. Ventral reaches above 1/2 way to the anal and equals about 1/6 of the entire length of the fish. First anal fin commences under about the 25th dorsal ray, it is highest anteriorly where it equals 4/5 of that of the body above it, its lower edge is very concave: second anal below but rather shorter than the second dorsal, its last ray prolonged. Caudal deeply forked. *Scales*—dermal productions lanceolate. *Lateral-line*—forms rather a strong curve to above the middle of the pectoral fin where it becomes straight: two keels on either side of the free portion of the tail, the superior being more developed than the inferior one. *Colours*—grayish superiorly, becoming dull beneath, tip of first dorsal and end of pectoral edged with black.

Habitat.—? East coast of Africa, seas of India, perhaps New Zealand, the largest specimen I saw in the Madras Museum was 4 feet 4 inches in length. I have to thank Dr. Bidie for procuring me the interesting specimen from which the figure has been made, it also was taken at Madras and is a little over 4 feet in length.

H. brevirostris, Playfair, is stated to have D. 38/7, A. 12/7, and the last portion of the dorsal and the ventral fins are shown as much lower, the second dorsal and both anals rather higher than in the specimen described above; still it must not be overlooked that his fish was a more adult specimen (being 10 feet 4 inches in length), and in such the posterior portion of the first dorsal has a tendency to decrease in height with age. It is closely allied to *Tetrapterus Lessonii*, Canest. Arch. Zool. 1861, i, p. 259, pl. 7, from the Mediterranean.

Family, XIV—TRICHIURIDÆ, *Günther.*

Trichiurinæ, *Swainson.*

Branchiostegals seven to eight: pseudobranchiæ. Body elongated and compressed. Gill openings wide. Eyes lateral. Cleft of mouth deep. Teeth in jaws or palate, several being strong and conical. Dorsal and anal fins many rayed: there may be finlets behind the dorsal or anal fins: ventrals, when present, thoracic, but sometimes they are rudimentary: caudal absent or present. Scales when present rudimentary. No prominent papilla behind the vent. Air-vessel present. Pyloric appendages few or many.

Uses.—These fishes are held in various estimation in different places. In Beloochistan and where salt is cheap no one will touch them, but along the coasts of India where the salt tax has ruined the fish curers' trade, they are more esteemed, mostly because being thin or ribbon-shaped they can be dried without salting. Russell observed that in his time they were esteemed by the European soldiers. Jerdon states that "they afford very delicate eating when fresh though never brought to the table of Europeans."

Geographical distribution.—Tropical seas and extending into more temperate regions.

Cantor observes that neither *Trichiurus haumela* nor *T. savala* are "electrical, but both give at certain seasons, like many other fishes, a vivid phosphorescent light."

SYNOPSIS OF INDIVIDUAL GENUS.

Genus, 1—Trichiurus,* *Linn.*

Enchelyopus, Klein: *Lepturus* (Art.) Gill, and *Eupleurogrammus*, Gill.

Branchiostegals seven: pseudobranchiæ. Body very elongate, strongly compressed, ribbon-shaped, tapering to a finless point at the tail. Cleft of mouth deep. Teeth in jaw and palatines, those in the premaxillaries being arched and very strong, whilst the lateral ones are lancet-shaped. A single long dorsal fin extending the whole length of the back: ventrals, when present, in the form of a pair of scales: anal spines minute, sometimes concealed beneath the skin. Scales absent. Air-vessel present. Pyloric appendages numerous.

SYNOPSIS OF SPECIES.

1. *Trichiurus muticus*, D. 140-150. Ventral fins in the form of two rudimentary scales. Silvery.
2. *Trichiurus haumela*, D. 127-133. Anal fin in the form of minute spines. Eyes from $1\frac{2}{3}$ to $2\frac{1}{3}$ diameters from end of snout. Silvery, upper third of dorsal fin dark. Seas and estuaries of India to China.
3. *Trichiurus savala*, D. 112-120. Eyes $2\frac{3}{4}$ to $3\frac{1}{2}$ diameters from end of snout. Anal fin in the form of spines. Silvery. Seas and estuaries of India to China.

1. Trichiurus muticus, Plate XLVII, fig. 5.

Gray, Zool. Misc. p. 10; Griffith, Cuv. Anim. King. Fishes, p. 349, pl. 6, f. 2; Günther, Catal. ii, p. 348.
? *Trichiurus intermedius*, Gray, l. c. p. 10; Richards. Ich. China, p. 268.
? *Trichiurus medius*, Griffith, l. c. pl. 6, fig. 3.

B. vii, D. 140-150, P. 11.

Length of head $10\frac{1}{2}$ to $11\frac{1}{4}$, height of body 1/16 to 2/33 of the total length. *Eyes*—diameter $6\frac{1}{2}$ in length of head, 2 diameters from end of snout, and nearly 1 apart. The height of the head equals 1/2 its length. The lower jaw slightly produced beyond the upper: the maxilla reaches to below the middle of the eye: interorbital space with a keeled ridge along its centre. *Teeth*—about 20 sharp compressed ones laterally in the upper jaw, whilst anteriorly are two pairs of large, curved, and usually (but not invariably) slightly barbed fangs: there are two similar but much smaller ones above the symphysis of the lower jaw, and which are anterior to the snout when the mouth is closed; laterally there are about 15 or 16 teeth similar to those in the upper jaw but smaller. *Fins*—the dorsal fin commences above the hind edge of the preopercle, its first rays are short, their length being about equal to one diameter of the orbit, the longest rays are only about equal to 1/2 the height of the body: the rudimentary ones have been enumerated in the numbers given above. Pectoral 1/3 as long as the head. Ventrals indicated by two small rounded scale-like productions on the lower surface of the abdomen, about 3/4 the length of the head posterior to the opercle. Anal spine almost or entirely concealed in the skin. *Lateral-line*—almost straight and a little below the middle of the body especially in the last part of its course. *Colours*—burnished silver, fins yellowish.

Habitat.—Seas of India to China, it is very common in Orissa up to about 25 inches in length. The one figured is $20\frac{1}{2}$ inches long and from Orissa.

* *Nus-sah-rue*, Mugh.: *Sawaryi*, Tel.

2. Trichiurus haumela.

Clupea haumela, Forsk. p. 72; Gmel. Linn. p. 1408.

Trichiurus lepturus, Lacép. ii, pl. 7, fig. 1; Russell, Fish. Vizag. i, p. 30, *Sawala*, pl. 41; Ham. Buch. Fish. Ganges, pp. 31, 364.

Trichiurus haumela, Cuv. and Val. viii, p. 249; Rüpp. N. W. Fische, p. 41; Swainson, Fishes, ii, p. 254; Cantor, Catal. p. 113; Bleeker, Makr. p. 41; Jerdon, M. J. L. and Sc. 1851, p. 139; Günther, Catal. ii, p. 348; Day, Fishes of Malabar, p. 66; Kner, Novara Fische, p. 140; Klunz. Verh. z. b. Ges. Wien, 1871, p. 471.

Trichiurus Malabaricus, Day, Fish. Malabar, p. 65, pl. v.

Enchelyopus haumela, Bleeker, Bintang. 1868, p. 4.

Puttiah, Ooriah: *Sawala*, Tel.: *Sona-ka-wahlah*, Tam.: *Pa-pa-dah*, Andam.

B. vii, D. 127-133, P. 11.

Length of head from 2/13 to 1/8, height of body from 1/12 to 1/15 of the total length. *Eye*—diameter $4\frac{3}{4}$ to $6\frac{1}{2}$ in length of head, $1\frac{2}{3}$ to $2\frac{1}{3}$ diameters from the end of snout, and 3/4 of a diameter apart: its height is at least 1/2 of that of the head where it is situated. Lower jaw considerably the longer, the posterior extremity of the maxilla reaches to below the middle of the orbit. Dorsal profile, between the end of the snout and the eye, rather concave. Height of head equals 2/5 of its length. *Teeth*—upwards of 10 to 12 sharp compressed ones laterally in either side of upper jaw, usually increasing in size posteriorly, whilst anteriorly in the premaxillaries are two pairs of large curved and barbed canines, there are two similar but smaller teeth above the symphysis* of the lower jaw (and in advance of the end of the snout when the mouth is closed), most distinct in the adult, and 8 lateral ones also of less size than those in the upper jaw, and some of which are occasionally barbed. Teeth also in the palatines. *Fins*—the first few dorsal rays are of less height than those near the middle of the fin which about equal that of the body. Pectoral nearly or quite as long as the height of the head. Behind the anus the anal fin is seen in the form of short spines, often entirely concealed or else blunted at their external extremities: in one specimen I count 74, in another 80. *Lateral-line*—gradually descends until above the commencement of the anal fin, where it is in the lower third of the body. *Colours*—grayish along the back, becoming silvery on the sides and beneath: a dark mark along the edge of the preorbital. Fins of a pale yellow, the upper half of the dorsal dark, due to numerous fine black dots.

Habitat.—East coast of Africa, seas and estuaries of India, and the Malay Archipelago to China, attaining at least 3 feet in length. It is extremely voracious, devouring its own species, as well as other kinds of fish and crustacea. It is much more common than *T. savala*.

3. Trichiurus savala, Plate XLVII, fig. 4.

Cuv. and Val. viii, p. 251, pl. 244; Cantor, Ann. and Mag. ix, p. 15, and Catal. p. 115; Bleeker, Makr. p. 41; Jerdon, M. J. L. and Sc. 1851, p. 139; Günther, Catal. ii, p. 347; Day, Fishes of Malabar, p. 67.

Trichiurus armatus, Gray, Zool. Misc. p. 9, and Ill. Ind. Zool. pl. 93, f. 1; Richards. Ich. China, p. 268; Griffith, in Cuv. Anim. Kingdom, Fishes, p. 349, pl. 6, f. 1.

Enhelyopus savala, Bleeker, Bintang. 1868, p. 14.

B. vii, D. 112-120, P. 11.

Length of head $7\frac{1}{2}$, height of body 1/16 of the total length. *Eye*—diameter 2/13 to 1/7 of length of head, $2\frac{3}{4}$ to $2\frac{1}{2}$ in the length of snout, and 1 apart: its height is about 1/3 of that of the head where it is situated. The height of the head equals $2\frac{1}{2}$ to $2\frac{2}{3}$ in its length. The lower jaw considerably prolonged beyond the upper: the maxilla reaches to below the middle of the eye. Interorbital space nearly flat: dorsal profile between upper surface of eyes and end of snout slightly concave. The distance from the eye to the upper jaw nearly equals the diameter of the orbit. *Teeth*—about 8 sharp and compressed ones laterally in the upper jaw, whilst anteriorly are two or three pairs of large, curved, and barbed fangs: there are two similar and rather smaller ones above the symphysis of the lower jaw, and which are anterior to the snout when the mouth is closed: laterally there are about 9 similar to those in the upper jaw but smaller. *Fins*—the dorsal fin commences over the hind edge of the preopercle, its first rays are short, being about equal to 1 diameter of the orbit, the longest rays are about equal to the height of the body. Pectoral 4/11 of the length of the head. No rudiment of ventral fins. Anal in the form of about 76 to 82 free spines which may be concealed in the skin but are generally distinct, especially the first, which is twice as long as seen in *T. haumela*. *Lateral-line*—passes downwards to the lower third of the side. *Colours*—silvery, fins yellowish white.

Habitat.—Seas and estuaries of India, the Malay Archipelago, and China, attaining at least 16 inches in length. The specimen figured is 12 inches long, and from Bombay, it has 113 dorsal rays.

* In a specimen from Orissa, nearly 19 inches long, only one such tooth exists, it is however upwards of 1/2 the diameter of the eye in length and barbed posteriorly.

Family, XV—ACANTHURIDÆ, (pt.) *Richards.*

Acanthurinæ, pt. Swains.: *Acanthuroidei*, Bleeker: *Acronuridæ*, Günther.

Branchiostegals from four to seven: pseudobranchiæ. Body oblong or elevated and compressed. Eyes of moderate size and lateral. Cleft of mouth very slight. Teeth in both jaws in a single compressed row, often lobate or serrated, and tapering incisors may be present. Palate edentulous. A single dorsal fin with fewer spines than rays: anal with two or three spines: ventrals thoracic. Scales minute. Lateral line complete and continuous. The side of the free portion of the tail usually armed with one or more bony plates or spines, these are small or absent in the immature, developing with age. Air-vessel present, forked posteriorly. Pyloric appendages few.

SYNOPSIS OF GENERA.

1. *Acanthurus.* An erectile spine on either side of the free portion of the tail: ventral usually with one spine and five rays. Scales small or even rudimentary. Red Sea, East coast of Africa, through the seas of India, and the tropics.

2. *Naseus.* One to three non-erectile spines on either side of the free portion of the tail: ventral with one spine and three rays. Scales minute or rudimentary. From the East coast of Africa through the seas of India to Polynesia.

Genus, 1—Acanthurus,* *(Forsk.) Bl.*

Opisotomus, Comm.: *Harpurus*, Forster: *Acronurus*, Cuv. (young): *Keris*,† pt., Cuv. (? young): *Ctenodon* and *Zabrasoma*, Swains.: *Scopas*, Kner: *Rhombotides*, Bleeker.

Branchiostegals five: pseudobranchiæ well developed. Body and head elevated and strongly compressed. Eyes high up. Teeth in a single row with lobate or serrated edges. A single dorsal fin with fewer spines than rays: anal with three spines: ventral usually with one spine and five rays. Scales small or minute, cycloid or ctenoid, sometimes spinate. A moveable spine exists in a groove on the side of the free portion of the tail, just below the lateral-line. Air-vessel large, posteriorly forked. Pyloric appendages few (5-7).

The caudal fin generally becomes more lobed or emarginate in the adults than it is in the young. In some instances (see *A hepatus*, p. 206) the rays in the ventral fin are decreased in number and rather altered in character.

The young of this genus have no scales, but the skin is vertically striated, sometimes with small rough points. In a specimen (*Acanthurus melanurus*, Cuv. and Val.) from Malabar, $1\frac{1}{2}$ inches in length, the most distinct appearance of scales is to be seen along the bases of the dorsal and anal fins. There are two parallel raised serrated ridges from the snout to opposite the nostril, whilst the anterior edge of the second spine of the dorsal fin is serrated. In a second specimen, although slightly smaller, little sharp points or rudimentary scales are to be seen, or appearing as if each ridge of the skin were ctenoid in places. In a specimen $2\frac{1}{5}$ inches in length, the serrations adverted to have disappeared and rudimentary scales are visible all over the body.

SYNOPSIS OF SPECIES.

A. Broad teeth fixed in the jaws: 8 or 9 dorsal spines: 5 ventral rays. *(Rhombotides.)*

1. *Acanthurus lineatus.* D. $\frac{8-9}{28-31}$, A. $\frac{3}{27}$. Upper two-thirds of body canary yellow, which, as well as the head, have 9 or 10 oblique blue bands. A semilunar blue band in the centre of the caudal. Seas of India to the Malay Archipelago.

2. *Acanthurus leucosternon.* D. $\frac{9}{29-30}$, A. $\frac{3}{27-28}$. Blue, head dark brown, chest white as is also a ring round the lower part of the mouth. A black band along base and either side of caudal fin, a second in its last fourth. East coast of Africa, seas of India to the Malay Archipelago.

3. *Acanthurus aurolineatus.* D. $\frac{9}{26}$, A. $\frac{3}{25}$. Bluish, with about 12 horizontal yellow bands, dorsal and anal fins likewise banded. Coromandel coast of India.

4. *Acanthurus triostegus.* D. $\frac{9}{23-25}$, A. $\frac{3}{20-22}$. Greenish, with a black ocular band, four more down the body and an interrupted one across the free portion of the tail.

5. *Acanthurus Tennentii.* D. $\frac{9}{25}$, A. $\frac{3}{22}$. Brown, white hind edge to the caudal fin, and ? a dark ring on the shoulder. Ceylon.

6. *Acanthurus matoides.* D. $\frac{9}{25-28}$, A. $\frac{3}{25-28}$. Brown, sometimes with blue lines on the body and fins, and a white ring at the base of the caudal fin. Red Sea, seas of India to the Malay Archipelago and beyond.

* *Kohli-meen*, Tam.

† The Genus *Keris*, C.V. appears to consist of the young of *Acanthurus*, or *Naseus*, or both.

7. *Acanthurus mata.* D. $\frac{9}{24-27}$, A. $\frac{3}{23-25}$. Brown, with black fins. Red Sea, seas of India to the Malay Archipelago.

8. *Acanthurus Celebicus.* D. $\frac{8-9}{26-25}$, A. $\frac{3}{24}$, L. l. 80. Brown, fins dark. Madras, Malay Archipelago.

9. *Acanthurus melanurus.* D. $\frac{9}{25-26}$, A. $\frac{3}{24}$. Scales rudimentary or absent. Black band over occiput, another across free portion of the tail. Seas of India to the Malay Archipelago.

B. Broad teeth fixed in the jaws: 8 or 9 dorsal spines: ventrals not fully developed.

10. *Acanthurus hepatus.* D. $\frac{9}{19-20}$. V. 1/2, A. $\frac{3}{19}$. Slatey gray, covered by a deep brown band in the upper half of its back, leaving an oval blotch of ground colour above the pectoral fin. Fins gray, spines and rays orange, caudal yellow. Seas of India to New Guinea.

C. Setiform moveable teeth dilated at their extremities: 8 or 9 dorsal spines: 5 ventral rays. *(Ctenodon.)*

11. *Acanthurus strigosus.* D. $\frac{8}{28-30}$, A. $\frac{3}{26-27}$. Teeth setiform with dilated extremities. Body brown lineated with bluish lines, red spots on the head. Red Sea, East coast of Africa, seas of India to the Malay Archipelago and beyond.

D. Broad teeth fixed in the jaws: 1 to 4 dorsal spines: 5 ventral rays. *(Harpurus.)*

12. *Acanthurus xanthurus.* D. $\frac{5}{24-25}$, A. $\frac{3}{20-21}$. Scales rudimentary, rough. Blackish, caudal yellow. Red Sea, East coast of Africa and Ceylon.

13. *Acanthurus velifer.* D. $\frac{3-4}{28-29}$, A. $\frac{3}{22-24}$. Scales rudimentary. Dorsal and anal fins much elevated. Brown, banded with narrow blue lines. Red Sea, East coast of Africa to the Malay Archipelago and beyond.

A. Broad teeth fixed in the jaws: 8 or 9 dorsal spines: 5 ventral rays. *(Rhombotides.)*

1. Acanthurus lineatus.

Chætodon lineatus, Linn. Nat. Hist. i, p. 1246.

Acanthurus lineatus, Bl. Schn. p. 214, t. xlix; Lacép. iv, pp. 547, 549; Cuv. and Val. x, p. 223; Bleeker, Sumatra, ii, p. 263; Günther, Catal. iii, p. 333; Kner, Novara Fische, p. 210.

Ctenodon lineatus, Swainson, Fishes, ii, p. 256.

Acanthurus vittatus, Benn. Fish. Ceylon, p. 2, pl. ii.

Rhombotides lineatus, Bleeker, Arou, 1873, p. 3.

B. v, D. $\frac{8-9}{28-31}$, P. 15, V. 1/5, A. $\frac{3}{27}$, C. 17.

Length of head $5\frac{1}{4}$ to $5\frac{1}{2}$, of caudal 2/7, height of body 1/3 of the total length. *Eyes*—diameter 2/9 of length of head, 3 to $3\frac{1}{2}$ diameters from end of snout, and $1\frac{1}{2}$ apart. Profile from dorsal fin to snout obtuse. The maxilla reaches 1/3 of the distance to below the orbit. *Teeth*—six or seven lobate incisors on either side of the upper jaw. *Fins*—dorsal spines rather weak and a little shorter than the rays, interspinous membrane scarcely notched. Pectoral as long as or slightly longer than the head. Caudal lobed, the upper the longer. *Scales*—about eight rows between the lateral-line and the base of the last dorsal spine. Lancet-shaped spine with a posterior process. Least depth of the free portion of the tail equal to 1/2 the length of the head. *Colours*—head and upper two-thirds of body canary yellow, traversed by nine or ten more or less oblique blue bands going from the head to the back and caudal fin: lower third of body reddish-gray. Two or three blue bands pass down the summit of the head and the anterior edge of the eye towards the snout, whilst about seven more pass across the cheeks to the bands on the body. Other blue bands pass upwards and backwards from the hind edge of the eye to the bands on the body. Dorsal and anal fins dark with a gray margin. Pectoral having its upper ray blue, and just internal to it a white line ascending 1/2 way up the ray: an arched white band on lower half of pectoral fin on its inferior side. Ventral with its outer ray blue, its inner ones red. Caudal with a semilunar blue band in its centre and a blue posterior edge. Bennett observes of Ceylon examples that amongst six or seven specimens no two were alike in the arrangement of the blue and yellow streaks near the caudal fin.

Habitat.—Seas of India to the Malay Archipelago: common at the Andamans in December and January up to 10 inches in length. Bennett says: "the *Seweyah (Acanthurus lineatus)* is an extremely scarce fish on the southern coast of Ceylon: inhabits rocky situations, and is not in request but for the gratification of the naturalist. It seldom exceeds 16 or 17 inches in length." (p. 2.)

2. Acanthurus leucosternon.

Benn. Proc. Zool. Soc. 1832, p. 183; Bleeker, Batoe, iii, p. 237; Günther, Catal. iii, p. 340.

Acanthurus Delisianus, Cuv. and Val. x, p. 193; Guér. Icon. Poiss. pl. xxxv, fig. 2; Griffith, in Cuv. Anim. Kingdom, Fishes, pl. xxxiii, fig. 2.

B. v, D. $\frac{9}{29-30}$, P. 16, V. 1/5, A. $\frac{3}{27-28}$, C. 17.

Length of head $4\frac{2}{3}$, of caudal $5\frac{1}{3}$, height of body about 2/5 of the total length. *Eyes*—diameter 2/7 of length of head, $2\frac{2}{3}$ diameters from end of snout, and $1\frac{1}{4}$ apart. Profile from the upper edge of the eye to the snout rather concave. *Teeth*—five truncated and lobate ones on either side of the upper jaw, and six in the lower. *Fins*—last dorsal spine as high as the rays, and equal to about 4/13 of the height of the body, the posterior extremity of the soft dorsal and anal fins rather angular. Pectoral as long as the head. Anal as

high as the soft dorsal: caudal emarginate. *Scales*—very small, rough and rudimentary on head and chest. Lancet-shaped spine with a posterior process. Least depth of free portion of the tail equals 3/7 of the length of the head. *Colours*—blue, head dark brown or black, chest white, as is also a ring on the lower part of the mouth, ascending to its angle. A broad bluish band passes down the shoulder to the axilla, which last has a triangular brown patch. A narrow crescentic black band across the base of the caudal, and continued along the upper and lower edges of the fin, a second wide one along the last fourth of the fin, and having a white outer border. Other fins stained gray at their edges.

Habitat.—East coast of Africa, Mauritius, Ceylon, to the Malay Archipelago. The above description is taken from the type specimen sent by Dr. Sibbald to the British Museum.

3. **Acanthurus aurolineatus**, Plate XLVIII, fig. 3.

B. v, D. $\frac{9}{26}$, P. 18, V. 1/5, A. $\frac{3}{25}$, C. 17.

Length of head $4\frac{1}{4}$, of caudal $5\frac{1}{3}$, height of body 2/5 of the total length. *Eyes*—high up, diameter 1/3 of length of head, $1\frac{1}{3}$ diameters from end of snout, and 1 apart. Preopercle entire. Upper profile of head rather convex. *Teeth*—on either side eight lobate ones in the upper, and eight or nine in the lower jaw. *Fins*—last dorsal spine 2/5 of the height of the body and of about the same length as the rays, last portion of the fin and of the anal rather angular, interspinous membrane very slightly emarginate. Pectoral about as long as the head; third anal spine rather above half the length of the head. Caudal emarginate. *Scales*—on head minute, very small on the body, about twenty rows between the lateral-line and base of the last dorsal spine. Lancet-shaped spine with a posterior process. Least depth of the free portion of the tail equal to 1 diameter of the orbit. *Colours*—a general yellowish tinge, with yellow horizontal lines along the body about 1/2 the width of the ground colour, which is bluish. A narrow lightish band over the base of the caudal. Dorsal and anal fins bluish, with several longitudinal yellow bands as seen on the body.

The specimen, figured life-size, is from the collection of Sir W. Elliot, K.C.S.I., and was captured at Waltair some years since.

Habitat.—Coromandel coast of India.

4. **Acanthurus triostegus**, Plate XLVIII, fig. 2.

Chætodon triostegus, Linn. Sys. i, p. 463.

Acanthurus triostegus, Bl. Schn. p. 215; Cuv. and Val. x, p. 197; Swainson, Fishes, ii, p. 255; Bleeker, Teuth. p. 13; Jenyns, Voy. Beagle, Fishes, p. 75; Jerdon, M. J. L. and Sc. 1851, p. 138; Günther, Catal. iii, p. 327.

Chætodon mootah, Russell, Fish. Vizag. i, p. 66, pl. 84.
Harpurus fasciatus, Forst. Desc. Anim. ed. Licht. p. 216.
Chætodon zebra, Lacép. iii, pl. 25, f. 3.
Acanthurus zebra, Lacép. iv, p. 546, pl. vi, f. 3.
Chætodon conagga, Lacép. iv, p. 727.
Acanthurus hirudo, Benn. Fish. Ceylon, p. 11, pl. xi.
Teuthis Australis, Gray in King's Survey Australia, ii, p. 435.
Acanthurus subarmatus, Benn. Whaling Voy. ii, p. 278.
Rhombotides triostegus, Bleeker, Solor, 1868, p. 2.
Mootah, Tel.: *Kara-pamoowah*, Cing.

B. v, D. $\frac{9}{23-25}$, P. 15, V. 1/5, A. $\frac{3}{20-22}$, C. 17.

Length of head $3\frac{3}{4}$ to 1/4, of caudal 1/5, height of body $2\frac{1}{3}$ to $2\frac{4}{5}$ in the total length. *Eyes*—diameter 2/7 of length of head, 2 to $2\frac{1}{2}$ diameters from end of snout, and 1 to $1\frac{1}{4}$ apart. Profile from above the orbit to the snout rather concave. *Teeth*—eight lobate incisors on either side of the upper jaw, and nine or ten on either side of the lower. *Fins*—dorsal spines moderately strong, the last 1/5 higher than the longest ray, and equal to $3\frac{3}{4}$ or 1/4 of the height of the body. Pectoral 4/5 as long as the head. Caudal lunated. *Scales*—rudimentary and cycloid on the head, small and ctenoid on the body: about twenty rows between the lateral-line and the last dorsal spine. Lancet-shaped spine with a sharp posterior process. Least depth of free portion of the tail equal to about $1\frac{1}{2}$ diameters of the orbit. *Colours*—greenish, with a brownish tinge along the back. One vertical dark band along the snout, a second through the orbit, four down the body, and one over the base of the caudal fin, the last being in the form of two rounded blotches, one above, the other below the lateral-line. Fins stained darkish.

Habitat.—Seas of India, to the Malay Archipelago and beyond. The specimen figured is from the Andaman islands, where it is common. As Jerdon observes this species is rare at Madras.

5. **Acanthurus Tennentii.**

Günther, Catal. iii, p. 337.

B. v, D. $\frac{9}{25}$, P 17, V. 1/5, A. $\frac{3}{22}$, C. 17.

Length of head 2/9, of caudal 2/11, height of body 2/5 of the total length. *Eyes*—diameter 2/7 of length of head, $2\frac{1}{2}$ diameters from the end of snout. Nostrils 2/3 the length of the head from the end of the snout. *Teeth*—eight lobate incisors on either side of the upper, and eight on either side of the lower jaw.

Fins—last dorsal spine nearly 1/3 the height of the body, and about equal to the rays: posterior extremity of the soft dorsal and anal rather angular. Pectoral as long as the head. Caudal emarginate. *Scales*—about fourteen rows between the lateral-line and the base of the last dorsal spine. A posterior process to the lancet-shaped spine. *Colours*—brown, caudal with a broad white posterior edge, having a dark base behind it. The skin in the British Museum has a dark ring on the shoulder, considered normal, but which appears very like an ink mark: the pectoral seems to have been tinged with yellow in its posterior half on the lower side.

Habitat.—An immature specimen from Ceylon in the British Museum.

6. Acanthurus matoides.

Chætodon nigrofuscus, Forsk. p. 64.

? *Chætodon nigricans*, Gmel. Linn. p. 1245.

Acanthurus nigricans, Bl. Schn. p. 211 (pt.).

? *Acanthurus rasi*, Cuv. and Val. x, p. 203.

Acanthurus matoides, Cuv. and Val. x, p. 204; Bleeker, Teuth. p. 12; Günther, Catal. iii, p. 330; Day, Fish. Malabar, p. 126; ? Kner, Novara Fische, p. 210; Playfair, P. Z. Soc. 1867, p. 858; Klunz. Verh. z. b. Ges. Wien, 1871, p. 508.

Acanthurus annularis, Cuv. and Val. x, p. 209 (with a whitish basal caudal band).

Acanthurus nigrofuscus, Cuv. and Val. x, p. 214 (not Günther, Catal.).

Acanthurus xanthopterus, Cantor, Catal. p. 206, pl. iv.

Rhombotides matoides, Bleeker, Sanger, 1868, p. 1.

B. v, D. $\frac{9}{25-28}$, P. 17, V. 1/5, A. $\frac{3}{25-28}$, C. 16, Vert. 9/13.

Length of head $4\frac{1}{3}$ to 1/5, of caudal $4\frac{1}{3}$, height of body $2\frac{1}{2}$ in the total length. *Eyes*—diameter $3\frac{1}{2}$ to $3\frac{2}{3}$ in the length of head, $2\frac{1}{4}$ diameters from end of snout, and 1 apart. Profile from snout to dorsal fin much elevated, and having a slight depression above the orbits. The distance from the anterior nostril to the front edge of the upper jaw equals about 2/3 of the length of the head: from the eye to the angle of the mouth 2/3 to 3/5 of the length of the head. Opercle striated. *Teeth*—eight or nine lobate or serrated incisors on either side of the upper jaw, and the same in the lower. *Fins*—dorsal spines of moderate strength, the last not quite so high as the first few rays, and equal to nearly 1/3 the height of the body: the interspinous membrane scarcely emarginate: the posterior extremity of the fin and also of the anal angularly rounded: pectoral nearly as long as the head. Ventral pointed, 4/5 as long as the pectoral. Third anal spine equals 2 diameters of the orbit in length: rays not quite so long as those of the dorsal. Caudal emarginate: in the adult as upwards of a foot in length its outer rays become elongated causing the fin to be deeply lunated in its last half. *Scales*—rudimentary and cycloid on head and over shoulders, chest, and in a band along the base of the dorsal fin: ctenoid, and in irregular rows on the body, about 18 to 20 rows between the lateral-line and base of the last dorsal spine. Lancet-shaped spine with a posterior process. Free portion of the tail at its lowest part equal to 1/2 the length of the head. *Colours*—brown, sometimes with narrow light bands across the cheeks and along the body: lips black: dorsal and anal fins with several longitudinal bands: caudal with a white band across its base, sometimes the rest of the fin is light-coloured with a crescentic dark mark at its posterior extremity. Outer half of pectoral yellowish-green.

Habitat.—Red Sea, seas of India to the Malay Archipelago and beyond. It is reputed to attain to 3 feet in length at Madras. The largest obtained by me was $22\frac{1}{2}$ inches long. It is said to be good eating but not brought to the tables of Europeans.

7. Acanthurus mata, Plate XLVIII, fig. 1.

Chætodon nigrofuscus ?, Russell, i, p. 64, and *Mata*, pl. 82 (not *C. nigrofuscus*, Forsk.).

Acanthurus mata, Cuv. and Val. x, p. 202; Bleeker, Java, ii, p. 432.

Acanthurus rasi, Jerdon, M. J. L. and Sc. 1851, p. 138 (not Cuv. and Val.).

Acanthurus Bleekeri, Günther, Catal. iii, p. 331; Klunz. Verh. z. b. Ges. Wien, 1871, p. 509.

Koli, Tam.

B. v, D. $\frac{9}{24-27}$, P. 17, V. 1/5, A. $\frac{3}{23-25}$, C. 16.

Length of head $4\frac{3}{4}$, of caudal $4\frac{2}{3}$, height of body $2\frac{2}{3}$ in the total length. *Eyes*—diameter $3\frac{3}{4}$ in length of head, $2\frac{1}{4}$ diameters from end of snout, and $1\frac{1}{4}$ apart. Profile from snout to dorsal fin nearly straight. The distance from the anterior nostril to the front edge of the upper jaw equals not quite 1/2 the length of the head, whilst it is about the same distance from the lower edge of the eye to the angle of the mouth. Opercle strongly striated, more strongly so and with a larger number of elevations than in *A. matoides*. *Teeth*—eight or nine incisors in the upper jaw serrated along 3/4 of their external edge, and the same in the lower. *Fins*—dorsal spines increase in length to the last which is nearly or as high as the anterior rays and equāls 1/3 in that of the body: the interspinous membrane scarcely emarginate; the posterior portion of the fin and also of the anal angularly rounded. Pectoral as long as the head. Third anal spine equal to about $1\frac{2}{3}$ diameters of the orbit and the rays similar to those of the soft dorsal. Caudal emarginate, upper lobe the longer. *Scales*—rudimentary on head and over the nape, becoming ctenoid and in angular rows on the body, there appear to be about 150 to 160 rows descending to the lateral-line: and about 16 or 18 rows between the lateral-line and base of the last dorsal spine. Lancet-shaped spine on the side of the free portion of the tail with a posterior process. *Colours*—blackish-brown: lips and fins black.

Variety (? *A. Dussumieri*, C. and V. x, p. 201) with numerous rather undulating narrow brown bands, the intermediate colour being bluish. Dorsal and anal fins with three or four longitudinal bands: a light band across the base of the caudal.

A. mata, has been separated from *A. matoides* owing to the upper profile of its snout not being so convex, and to the distance of its nostril from the edge of the upper jaw equalling 1/2 (instead of 2/3) the length of the head. The affinities are so great that probably they might with justice be considered varieties.

Habitat.—Red Sea, seas of India to the Malay Archipelago. The specimen figured ($7\frac{1}{4}$ inches in length) was taken at Madras, it is said to attain 18 inches in length.

8. Acanthurus Celebicus.

Bleeker, Celebes, iii, p. 761; Günther, Catal. iii, p. 339; Kner, Novara Fische, p. 211.

? Acanthurus fuscus, Steind. Verh. z. b. Ges. Wien, 1861, p. 176, t. v.; Günther, Catal. iii, p, 339 (? adult).

B. v, D. $\frac{8-9}{26-25}$, P. 16, V. 1/5, A. $\frac{3}{24}$, C. 16.

Length of head $4\frac{3}{4}$, of caudal $3\frac{2}{3}$, height of body nearly 1/3 in the total length. *Eyes*—diameter about $3\frac{3}{4}$ in the length of head. Profile of snout concave. *Teeth*—about 16 lobate incisors in the upper and 20 in the lower jaw. *Fins*—last dorsal spine the longest: dorsal and anal rays of about the same height and equal to about $2\frac{1}{3}$ in that of the body, the posterior extremity of both fins obtusely rounded. Ventral and caudal lobes pointed. *Scales*—small, ctenoid, but much larger than in *A. matoides* or *A. mata*, there being about 80 rows. *Colours*—brownish, darkest about the head, lips black, a white ring round the mouth. Dorsal, anal, and ventral fins blackish brown: outer half of pectoral yellowish. Caudal blackish, posteriorly yellowish.

Habitat.—Malay Archipelago. Kner states that he received a single specimen from Madras.

9. Acanthurus melanurus.

Cuv. and Val. x, p. 240; Bleeker, Amb. and Ceram, p. 271.

Acronourus melanurus, Günther, Catal. iii, p. 346.

B. v, D. $\frac{9}{25-26}$, P. 15, V. 1/5, A. $\frac{3}{24}$, C. 16.

Length of head 2/7, of caudal 1/5, height of body 1/2 the total length or 2/3 of that of the oval portion. *Eyes*—diameter $2\frac{1}{3}$ in the length of head, 1 diameter from end of snout (see p. 202). *Fins*—second dorsal spine longest and strongest, being nearly equal to 1 diameter of the orbit. Caudal cut square or slightly emarginate. *Scales*—rudimentary or absent. *Colours*—brownish-white with a black band over the occiput and another over the free portion of the tail. From the whole of the space below the eye and opercle a silvery band passes downwards to the chest. One specimen has a dark mark on the shoulder.

As the longest specimen I could obtain is only $1\frac{1}{2}$ inches in length it appears reasonable to believe that this may be the fry of some known form as *A. matoides*, of which I have small specimens, giving the following:

1. *Acanthurus melanurus*,	$1\frac{1}{2}$	inches long	:	height of body	1/2	of the total length.
2. *Acanthurus melanurus*,	$1\frac{1}{2}$	,,	:	,,	$2\frac{1}{8}$	,, ,,
3. *Acanthurus matoides*,	$2\frac{1}{5}$	,,	:	,,	$2\frac{1}{4}$	,, ,,
4. *Acanthurus matoides*,	$2\frac{3}{4}$	,,	:	,,	$2\frac{1}{2}$	,, ,,

In Cuv. and Val. this species is said to come from Pondicherry and to be obtained up to 2 inches in length. It is also found in the Malay Archipelago.

Acanthurus melas, Cuv. and Val. x, p. 241, appears to be the same, but having the colours of *A. matoides*.

Habitat.—Seas of India to the Malay Archipelago.

B. Broad teeth fixed in the jaws: 8 or 9 dorsal spines: ventrals not fully developed.

10. Acanthurus hepatus.

Teuthis hepatus, Linn. Syst. Nat. i, p. 507; Gmel. Linn. i, p. 1362.

Acanthurus hepatus, Bl. Schn. p. 211; Cuv. and Val. x, p. 183, pl. 288; Bleeker, Floris, p. 325; Günther, Catal. iii, p. 341.

Acanthurus theuthis, Lacép. iv, pp. 549, 553.

B. v, D. $\frac{9}{19-20}$, P. 15, V. 1/2, A. $\frac{3}{19}$, C. 17.

Length of head 2/9, of caudal 1/6, height of body $2\frac{3}{4}$ in the total length. *Eyes*—diameter 1/5 of length of head, $3\frac{1}{2}$ diameters from end of snout, and 2 apart. Upper profile of head rather convex. Preopercle entire. *Teeth*—six lobate incisors on either side of both the upper and lower jaws. *Fins*—last dorsal spine higher than the first ray, beyond which the height of the rays gradually diminishes, the end of the fin being rather angular; the interspinous membrane scarcely emarginate. Pectoral 4/5 the length of the head. Ventral spine strong, nearly 1/2 as long as the head, its inner ray also spinate at its commencement, but having a bifurcated rayed extremity. Caudal emarginate, its outer rays being prolonged. *Scales*—the dermal productions are stellate and rough, about 12 rows exist between the lateral-line and the base of the last dorsal spine; none on the fins. Lancet-shaped spine on side of tail, without any exposed posterior process. *Colours*—slatey-gray along the back, becoming dashed with brownish-gray along the abdomen. A deep brown band ascends from the posterior-superior angle of the eye, and passing backwards gradually widens until below the fifth or sixth

dorsal spine it extends over the upper half of the back, leaving an oval spot of ground colour as long as the head, uncovered in the middle of the first part of its course. Just before reaching the lancet-shaped process it divides into two portions, which rapidly narrow, and pass along either side of the lobes of the tail. Dorsal spines orange-brown, the membrane light slate colour, having the upper edge of the fin stained with black. Pectoral blackish-gray, with a large yellow oval spot on its last fourth. Anal similar to dorsal. Caudal canary-yellow, which colour extends on to the free portion of the tail, as far as the lancet-shaped spine.

Habitat.—Seas of India to New Guinea.

C. Setiform moveable teeth, dilated at their extremities. (*Ctenodon.*)

11. **Acanthurus strigosus**, Plate XLVII, fig. 2.

Acanthurus strigosus, Bennett, Zool. Journal, Fasc. xiii, p. 41; Cuv. and Val. x, p. 243; Günther, Catal. iii, p. 342; Bleeker, Nat. Tyds. Ned. Ind. iv, p. 264, and vi, p. 102; Kner, Novara Fische, p. 211.

Acanthurus ctenodon, Cuv. and Val. x, p. 241, pl. 289; Günther, Catal. iii, p. 342; Bleeker, Solor, 1868, p. 2; Klunz. Verh. z. b. Ges. Wien, 1871, p. 509.

B. v, D. $\frac{8}{28-30}$, P. 17, V. 1/5, A. $\frac{3}{26-27}$, C. 17, L. l. ca. 120.

Length of head $4\frac{1}{2}$ to $4\frac{2}{3}$, of caudal 1/4 to $4\frac{1}{2}$, height of body $2\frac{2}{3}$ in the total length. *Eyes*—high up, diameter 1/4 of length of head, nearly $2\frac{1}{4}$ diameters from end of snout, and $1\frac{1}{3}$ apart. Profile of snout very gibbous. Mouth compressed so as to become angular. *Teeth*—setiform, moveable, having their outer third dilated and spoon-shaped, with three deep clefts causing them to appear to be laterally serrated: about twenty-one in the upper and twenty in the lower jaw. *Fins*—last dorsal spine 1/5 shorter than the longest ray, and 1/2 the length of the head; soft portions of the dorsal and anal fins rather angular posteriorly. Pectoral nearly as long as the head. Caudal deeply lunated. *Scales*—rounded, small and cycloid on the head, ctenoid on the body, about nine rows between the lateral-line and the base of the last dorsal spine. Lancet-shaped spine with a sharp posterior process. Free portion of the tail in its least depth equal to $2\frac{1}{4}$ in the length of the head. *Colours*—body horizontally lineated with narrow bluish lines on a yellow ground colour, the latter being somewhat the wider: numerous dull red spots about the head, more especially around the eyes. Dorsal and anal fins also lineated, and a light vertical band on the middle of the caudal.

Although the typical specimens of *A. strigosus* have more teeth in the lower jaw (about 25 on either side) than in *A. ctenodon*, and one or two more rows of scales between the lateral-line and base of the last dorsal spine, whilst the horizontal bands are more distinct, they appear to be otherwise the same, and only varieties of one species.

Habitat.—Red Sea, East coast of Africa, seas of India to the Malay Archipelago, and beyond: the specimen figured was captured at the Andaman islands.

D. Broad teeth fixed in the jaws, 1 to 4 dorsal spines: 5 ventral rays. (*Harpurus.*)

12. **Acanthurus xanthurus.**

Blyth, Fauna Ceylon, Appendix, p. 50; Günther, Catal. iii, p. 343; Playfair, Fish. Zanzibar, p. 57, pl. viii, f. 4; Klunz. Verh. z. b. Ges. Wien, 1871, p. 504.

B. v, D. $\frac{5}{24-25}$, P. 15, V. 1/5, A. $\frac{3}{20-21}$, C. 17.

Length of head 2/9, of pectoral 1/5, height of body 2/5 of the total length. *Eyes*—diameter 1/4 of head, $2\frac{1}{2}$ diameters from end of snout, and $1\frac{1}{4}$ apart. *Teeth*—in a single row, 10 lobate incisors on either side of the upper jaw. *Fins*—last dorsal spine longest, almost equalling the length of the longest ray, and 2/5 of the height of body: dorsal rays nearly half as high as the body, the posterior end of it and of the anal rather angular; third anal spine the longest and strongest: caudal slightly emarginate. *Scales*—on the head very rough, somewhat similar to what is seen in *Balistes*, those on the body are likewise rough, but in a less degree: some of these roughnesses are continued on to the rays of the dorsal and anal fins, and a few between the spines and rays of the former, but more at the base only of the anal fin. No posterior process to the lancet-shaped spine, but two or three elevations near its base. *Colours*—blackish, caudal canary-yellow, head and shoulders reticulated with gray: end of the pectoral stained with yellow.

Habitat.—Red Sea, East coast of Africa, and Ceylon. Grows to at least 8 inches in length.

13. **Acanthurus velifer.**

Bloch, t. 427, f. 1; Bl. Schn. p. 215; Lacép. iv, pp. 547, 553; Cuv. and Val. x, p. 251; Rüpp. Atl. Fische, p. 58, t. xv, f. 2; Bleeker, Cocos, iv, p. 451, and Batoe, p. 315; Jerdon, M. J. L. and Sc. 1851, p. 138; Günther, Catal. iii, p. 344; Klunz. Verh. z. b. Ges. Wien, 1871, p. 505.

Zabrasoma velifer, Swainson, Fishes, ii, p. 256.

Acanthurus Rüppellii, Benn. Proc. Z. S. 1835, p. 207; Bleeker, Batoe, p. 316; Günther, Catal. iii, p. 345.

Acanthurus Desjardinii, Bennett, l. c. p. 127; Günther, Catal. iii, p. 344.

Acanthurus Blochii, Bennett, P. Z. S. 1835, p. 207.

B. v, D. $\frac{3-4}{28-29}$, P. 17, V. 1/5, A. $\frac{3}{22-24}$, C. 17, Vert. 9/13, Cæc. pyl. 7.

Length of head 1/4 to $4\frac{3}{4}$, of pectoral 1/4, of caudal 1/5, height of body from 1/2 to 1/3 of the

total length. *Eyes*—diameter 1/3 of length of head, $1\frac{1}{2}$ diameters from end of snout, and 1 apart. Profile over snout concave. *Teeth*—six lobate incisors on each side of the upper jaw. *Fins*—dorsal very elevated, fourth dorsal ray highest, and equal to from 1/2 to 1/3 of the length of the body: anal also elevated, but not so much so as the dorsal, it begins under ninth dorsal ray. *Scales*—rudimentary, ctenoid. *Lateral-line*—present. *Colours*—grayish, with nine vertical bands, having white edges, from the back to the abdomen. The ocular band passes through the eye and to the base of the ventral fin; the second band through the base of the pectoral to the anus. Head sometimes with white spots. Dorsal with four curved blue or white bands, six on the anal and four on the caudal. These bands being more or less continuations of those on the body but more vertically curved. Caudal usually spotted with white or a light colour.

Jerdon observes of this species "*Grumbum*. Tam. rare. I have only seen a dried skin procured by W. Elliot, Esq." A specimen in the Calcutta Museum from the Andamans is $8\frac{3}{4}$ inches in length. One in the British Museum 16 long and 14 high.

Col. Playfair (Fish. Zanzibar, p. 57) observes of *A. Desjardinii*, "this may prove to be only the adult state of *Acanthurus velifer*, Bloch." But as his two specimens of *A. Desjardinii*=$6\frac{1}{2}$ and 7 inches respectively, and the type in the British Museum only 5 inches, and these are the whole of those present, it is hardly a tenable conclusion that they are the adult form, when an *A. velifer*, 16 inches long, exists in the collection.

Habitat.—From the Red Sea and East coast of Africa, through the seas of India to New Guinea.

Genus, 2—Naseus, *Commer.*

Monoceros, Bl. Schn.; *Naso*, Lacép.; *Aspisurus*, (Lacép.) Rüpp.; *Axinurus* and *Priodon*, Cuv. and Val.; *? Keris*, part Cuv. and Val.; *Callicanthus*, Swainson.

Branchiostegals four or five: pseudobranchiæ well developed. Body rather elevated and compresssd. Eyes high up, anterior to which there is a bony prominence, frontal horn, or crest-like protuberance. Teeth in the jaws in a single row and sometimes having their edges serrated: palate edentulous. A single dorsal fin having few spines (4-6) and many rays. Anal with two spines, its rays similar to those of the dorsal. Ventral with one spine and three rays. Scales rudimentary in the form of roughnesses of the skin like shagreen. Free portion of the tail having from 1 to 3 keeled bony plates on either side in the adult, which are indistinct or even absent in young specimens. Air-vessel large, posteriorly forked. Pyloric appendages few (5-8).

These fishes are said to have a very convoluted intestinal tract and to be herbivorous. They appear to be found in Ceylon and probably may be taken at the Andamans.

Geographical distribution.—Red Sea, East coast of Africa, seas of India to Polynesia.

SYNOPSIS OF SPECIES.

1. *Naseus tuberosus.* D. $\frac{5-6}{26-30}$, A. $\frac{2}{27-28}$. Teeth smooth. Anterior surface of forehead prominent. Gray, dorsal and anal fins banded, pectoral and caudal edged with white. Mauritius and Ceylon to Polynesia.

2. *Naseus brevirostris.* D. $\frac{6}{27-29}$, A. $\frac{2}{28-30}$. Teeth finely serrated. A horn from opposite lower portion of eye. Gray, with short transverse spots on the hind portion of the body. Caudal with a light edge. Seas of India to the Malay Archipelago and beyond.

3. *Naseus unicornis.* D. $\frac{5-6}{27-28}$, A. $\frac{2}{26-28}$. Teeth smooth. Forehead with a long horn from opposite upper third of eye. Dorsal and anal fins with longitudinal bands: caudal yellowish. Red Sea, East coast of Africa, seas of India to Polynesia.

1. Naseus tuberosus.

Naso tuberosus, Lacép. iii, p. 111, t. vii, f. 3.
Acanthurus nasus, Shaw, Zool. v, p. 376, pl. 51.
Naseus tuber, Cuv. and Val. x, p. 290.
Naseus tuberosus, Günther, Catal. iii, p. 353.

B. v, D. $\frac{5-6}{26-30}$, P. 18, V. 1/3, A. $\frac{2}{27-28}$, C. 16.

Length of head $4\frac{1}{2}$ to 1/5, of caudal $5\frac{1}{4}$ to 1/6, height of body 1/3 to $3\frac{1}{2}$ in the total length. *Eyes*—diameter $3\frac{1}{2}$ to 1/5 of the length of head, $2\frac{1}{2}$ to $3\frac{1}{2}$ diameters from end of snout, and $1\frac{1}{4}$ to $1\frac{1}{2}$ apart. Anterior profile of the snout convex, forming a crest-like prominence in the adult. *Teeth*—rather compressed, pointed, and from 18 to 20 on either side of both jaws. *Fins*—in young specimens the dorsal spines appear to be comparatively longer than in adults: in one of the latter the length of the fourth spine equalled its distance from the base of the first. Pectoral equals 3/4 of the length of the head. Caudal emarginate, but subject to great variation, in some being almost truncated, whilst in others the outer rays are considerably produced. Free portion of the tail with two strong sharp lancet-shaped spines, one behind the other on either side in the adult. *Colours*—gray, becoming dull yellow along the abdomen and covered with small dark spots. Dorsal and anal fins with a narrow dark base, external to which is a broad orange band, margined with black and externally edged with white. Pectoral and caudal edged with white.

Habitat.—From the Mauritius and Ceylon to Polynesia.

2. Naseus brevirostris, Plate XLVIII, fig. 4.

Cuv. and Val. x, p. 277, pl. 291; Bleeker, Celebes, iv, p. 165, and Celebes, viii, p. 306; Günther, Catal. iii, p. 349; Klunz. Verh. z. b. Ges. Wien, 1871, p. 71.

Naseus Hoedtii, Bleeker, Amboina, iv, p. 339.

B. v, D. $\frac{6}{27-29}$, P. 16, V. 1/3, A. $\frac{2}{28-30}$, C. 16.

Length of head $4\frac{1}{4}$, of caudal $5\frac{3}{4}$ to one-sixth, height of body $2\frac{2}{3}$ in the total length. *Eyes*—diameter $3\frac{3}{4}$ in the length of head, $2\frac{1}{4}$ diameters from the end of snout, and $1\frac{1}{4}$ apart. Profile from the snout to above the orbits very abrupt, with a large horizontal horn in front of the eyes, varying in size with age. *Teeth*—small, about 40 in either jaw, and finely serrated. *Fins*—the height of the fifth dorsal spine equals its distance from the base of the first, the spines not quite so high as the rays. Anal rays not so high as those of the soft dorsal. Caudal emarginate. Free portion of the tail with two moderately strong spines on either side. *Colours*—grayish, with numerous short blue transverse spots or lines in the last half of the body. Caudal with a light edge.

Habitat.—Seas of India to the Malay Archipelago and Polynesia.

3. Naseus unicornis.

Monoceros piscis et *minor*, Willughby, pp. 150, 216, t. O. 4.

Chætodon unicornis, Forsk. p. 63, and Icones, t. xxiii; Gmel. Linn. i, p. 1268.

Monoceros raii et *biaculeatus*, Bl. Schn. pp. 180, 181, t. xlii.

Naso fronticornis, Lacép. iii, pp. 105, 106, t. vii, f. 2.

Acanthurus unicornis, Shaw, Zool. iv, p. 374, pl. 50.

Aspisurus unicornis, Rüpp. Atl. Fische, p. 60.

Naseus fronticornis (Comm.) Cuv. and Val. x, p. 259; Temm. and Schleg. Fauna Japon. Poiss. p. 129, t. lxix; Richards. Ich. China, p. 244; Bleeker, Batoe, iii, p. 238, and Waigou, 1868, p. 3; Cuv. Règ. Anim. Ill. Poiss. pl. 72, f. 2.

Naseus longicornis, Cuv. in Guér. Icon. Poiss. pl. 35, f. 3; Griffith in Cuv. Anim. King. Fishes, pl. 33, f. 3.

Naseus olivaceus, (Solander) Cuv. and Val. x, p. 288 (young).

Harpurus monoceros, Forst. Desc. Anim. ed. Licht. p. 219.

Acronurus Ægyptius, Gronov. ed. Gray, p. 191.

Acronurus criniger, Gronov. ed. Gray, p. 192.

Naseus unicornis, Günther, Catal. iii, p. 348; Klunz. Verh. z. b. Ges. Wien, 1871, p. 72.

B. iv, D. $\frac{5-6}{27-28}$, P. 17, V. 1/3, A. $\frac{2}{26-28}$, C. 16.

Length of head $4\frac{1}{4}$ to $4\frac{1}{2}$, of caudal $5\frac{1}{2}$, height of body $2\frac{3}{4}$ in the total length. *Eyes*—diameter one-fourth to $5\frac{1}{2}$ in the length of head, $3\frac{1}{4}$ to 4 diameters from the end of snout, and $1\frac{1}{2}$ apart. Forehead with a long horn-like production on a level with the middle or upper edge of the eye, and increasing in length with age: in one 10 inches long it is 1/2 an inch, another at 14 inches it is 1 inch, whilst in a third a little over 20 inches it is $3\frac{1}{8}$. *Teeth*—rather compressed, pointed, with smooth edges, and about 15 on either side of both jaws. *Fins*—fifth dorsal spine equals its length from the base of the first spine and 1/4 higher than the rays. Pectoral 2/3 as long as the head. Anal rays not quite so high as those of the soft dorsal. Caudal slightly emarginate. Free portion of the tail with two strong lancet-shaped spines on either side. *Colours*—grayish superiorly, becoming tinged with yellow on the abdomen: dorsal and anal fins with longitudinal orange stripes and a blue outer edge: tail yellowish.

Habitat.—Red Sea, East coast of Africa, seas of India to Polynesia.

FAMILY, XVI—CARANGIDÆ, *Günther.*

Scomberoidei, pt., et *Squamipinnes*, pt., Cuv.: *Scombrisidæ*, pt., Richardson.

Branchiostegals usually seven, occasionally less: pseudobranchiæ as a rule present, but absent in *Lichia* and *Trachynotus*. Body oblong, elevated, or sub-cylindrical and compressed. Gill-openings wide. Eyes lateral. Infraorbital bones do not articulate with the preopercle. Dentition varied. The length of the base of the spinous portion of the dorsal fin is of less extent than that of the soft, and is sometimes formed by isolated spines: the spinous may be continuous with or distinct from the soft portion: the posterior portion both of the dorsal and anal sometimes consists of detached finlets: the soft dorsal and the anal of nearly equal extent. Anal spines, when present, may or may not be continuous with the soft portion. Ventrals, when present, thoracic, sometimes rudimentary. Scales usually small, unless absent. Lateral-line may be wholly, partially, or not at all armed with shield-like plates. Air-vessel present. Pyloric appendages usually in large numbers. Vertebræ 10/14 (Naucrates 10/16).

SYNOPSIS OF GENERA.

1. *Caranx.* Lateral-line wholly or only partially formed of plate-like scales, each of which is armed with a lateral spinate keel.
2. *Micropteryx.* Lateral-line smooth: abdomen trenchant.
3. *Seriola.* Lateral-line smooth: abdomen rounded.
4. *Seriolichthys.* Lateral-line smooth: a finlet behind the dorsal and anal fins.
5. *Naucrates.* Lateral-line smooth: dorsal fin reduced to a few spines: no finlets: pre-anal spines in the young. A keel on either side of the tail.
6. *Chorinemus.* First dorsal formed of isolated spines: posterior rays of dorsal and anal fins in the form of finlets: dermal productions usually lanceolate.
7. *Trachynotus.* First dorsal formed of isolated spines: no finlets behind dorsal and anal fins. Scales rounded.
8. *Psettus.* No pre-anal spines: ventrals rudimentary: no finlets: vertical fins scaled.
9. *Platax.* No pre-anal spines: ventrals well developed: no finlets: vertical fins scaled.
10. *Psenes.* No pre-anal spines: two separate dorsal fins: no finlets behind dorsal or anal fins.
11. *Equula.* No pre-anal spines. Mouth very protractile. Teeth small and of equal size. Scales cycloid.
12. *Gazza.* No pre-anal spines. Mouth very protractile. Canine-like teeth in the jaws. Lower edge of preopercle serrated.
13. *Lactarius.* No pre-anal spines. One or two pairs of canines. Lower edge of preopercle entire.

Genus, 1—CARANX, *Lacép.*

Trachurus, *Olistus*, *Blepharis*, *Gallichthys*, *Scyris*, et *Hynnis*, Cuv. and Val.:* *Megalaspis*, *Decapterus*, *Selar*, *Carangichthys*, *Carangoides*, *Leioglossus*, *Uraspis*, *Selaroides*, *Gnathanodon*, and *Hemicaranx*, Bleeker: *Carangus* (C. and V.) Girard: *Trachurops*, *Carangops*, and *Paratractus*, Gill.

Branchiostegals seven: pseudobranchiæ. Body oblong, sub-cylindrical, and more or less compressed. Eyes lateral. Dentition feeble. Two dorsal fins: the first continuous, having about eight weak spines, which are sometimes rudimentary, at its base anteriorly is a recumbent spine directed forwards: the second dorsal longer than the first and similar to the anal: sometimes the last rays of both these fins wholly or only semi-detached: two pre-anal spines (which may be rudimentary) they are separated by an interspace from the rays. Scales minute. Lateral-line with an anterior curved portion, whilst the posterior is straight, having large plate-like scales, which are usually keeled and sometimes spinate. Air-vessel bifurcated posteriorly. Pyloric appendages in large numbers.

* The following are the principal distinctions of the genera instituted by Cuv. and Val., which are included in Genus *Caranx* of Lacépede.

1. *Trachurus.* Lateral-line entirely covered by plate-like, keeled scales.
2. *Caranx.* Subdivided into (1) those with several finlets: (2) a single finlet: (3) no finlets, form but little elevated and profile nearly straight: (4) those having the skull elevated and compressed, and the dorsal profile forming the arc of a circle, or the *Carangues*: (5) the last group with the points of the dorsal and anal very prolonged, or *Citulas*.
3. *Olistus* are *Citulas* with several of their dorsal and anal rays being unbranched and having filamentous terminations.
4. *Blepharis.* Body as high as long, and a very elevated profile. A rudimentary first dorsal fin. A portion of the anterior dorsal and anal rays filamentous.
5. *Gallichthys.* Body less elevated. A rudimentary first dorsal fin. Anterior dorsal and anal rays prolonged into filaments. Ventrals very long.
6. *Scyris.* Profile more like the last, with short ventrals.
7. *Hynnis.* No first dorsal fin. No filamentous prolongation of the rays. Ventrals short.

The Genus *Caranx* contains so many species and varieties of forms that it is not surprising it has been numerously subdivided. If we examine those living in the Indian seas, we find the dentition modified in various ways, each of which has been made to constitute a genus.*

The forms of the fins have been employed as generic characters, as to whether the soft dorsal and anal have or have not finlets posteriorly, if several *Megalaspis*, if only one *Decapterus*. Or the first dorsal, present in the young, may disappear with age, as in *Blepharis*, *Scyris*, and *Gallichthys*. Or some of the dorsal and anal rays may be elongated, as *Olistus*, &c.

The preopercle may be serrated or entire, but certainly in one species (*C. oblongus*) that bone is serrated in the young, but not distinctly so in the adult, and consequently Genus *Carangichthys* cannot be valid.

The scales of the lateral-line also have given generic characters, thus if the keeled scales exist along its whole extent, the term *Trachurus* has been used. In some the body is almost scaleless, *C. ciliarus* and *C. gallus:* in others though the body is scaled the chest may be scaled or scaleless. The latter again may be subdivided into, first, those in which this scaleless portion extends as high up the breast as the base of the pectoral fins, and appears to continue so through life as in *C. gymnostethoides*, *C. Malabaricus*, *C. nigrescens*, *C. atropus*, and *C. armatus;* or, secondly, such species wherein the chest is equally scaleless in the immature, but a portion of this space becomes partially scaled in the adult, as *C. carangus* and *C. oblongus*.

The eyes in some have a well developed adipose eyelid on both sides, or only on one: or adipose lids may be minute or entirely absent.

I propose subdividing the Genus *Caranx* into (1) those species which have the palate toothed, and (2) such as have it toothless.

SYNOPSIS OF SPECIES.

A. Teeth on the palate.

a. Several finlets behind dorsal and anal fins.

1. *Caranx Rottleri*, D. 6-8 | $\frac{1}{9-11}$ + viii-x, A. 2 | $\frac{1}{8-9}$ + vii-viii, L. l, 55.† A dark opercular spot. Red Sea, seas of India, Malay Archipelago, and beyond.

b. A single finlet behind dorsal and anal fins.

2. *Caranx kurra*, D. 8 | $\frac{1}{29-30}$ + i, A. 2 | $\frac{1}{25-27}$ + i, L. l. 33. A dark opercular spot. Red Sea, seas of India to the Malay Archipelago.

c. No finlets, outer row of premaxillary teeth distinctly enlarged: a single row in lower jaw, with often two or four canines.

3. *Caranx melampygus*, D. 8 | $\frac{1}{21-23}$, A. 2 | $\frac{1}{17-19}$, L. l. 34-36. Height of body 2/7 of total length. Eye with a broad posterior adipose lid. Second dorsal anteriorly 2/3 the height of the body. Lateral-line arches to below seventh dorsal ray. Chest scaled. A small black opercular spot. Seas of India to the Malay Archipelago.

4. *Caranx jarra*, D. 8 | $\frac{1}{22}$, A. 2 | $\frac{1}{18}$, L. l. 33-36. Height of body $3\frac{2}{3}$ in the total length. Eye with a broad posterior adipose lid. Second dorsal anteriorly 3/5 the height of the body. Lateral-line forms an undulating curve to below seventh dorsal ray. Scaleless below the ventral fin. No opercular spot. Seas of India to the Malay Archipelago.

5. *Caranx carangus*, D. 8 | $\frac{1}{20-22}$, A. 2 | $\frac{1}{15-18}$, L. l. 33-37. Height of body 1/3 of the total length. Eye with a narrow posterior adipose lid. Second dorsal anteriorly about 1/2 as high as the body. Lateral-line curves to below sixth dorsal ray. Scaleless before the ventral fin and sometimes as high laterally as the base of the pectoral. No opercular spot. Seas of India to the Malay Archipelago and beyond.

* The following Genera have been proposed by Bleeker in his Ich. of Amboina, p. 408, and Fish. Madag.

A. *Finlets present.*

Megalaspis. Teeth in lower jaw in many rows. Teeth on vomer, palate, and tongue. Dorsal and anal fins with several finlets posteriorly.

Decapterus. Teeth in upper and lower jaws in a single row. Teeth on vomer, palate, and tongue. Dorsal and anal fins with a single finlet posteriorly.

B. *Finlets absent.*

Selar. A single row of teeth in both jaws. Teeth on vomer, palate, and tongue.

Caranx. Several rows of teeth in premaxillaries, the outer of which is enlarged. A single row in the lower jaw, with two or four canines anteriorly. Teeth on vomer, palate, and tongue.

Carangichthys. Preopercle serrated. Several rows of teeth in both jaws, the outer being the larger, several of those anteriorly in the lower jaw canine-like. Teeth on vomer, palate, and tongue.

Carangoides. Several rows of equal sized teeth in both jaws. Teeth on vomer, palate, and tongue.

Leioglossus. A single row of equal sized teeth in either jaw. Teeth on vomer and palatines, none on tongue.

Uraspis. Two rows of teeth in either jaw. Vomer, palatines, and tongue edentulous.

Selaroides. A single row of teeth on lower jaw and tongue. Premaxillaries, vomer, and palate edentulous.

Gnathanodon. Tongue scabrous. Jaws, vomer, and palate edentulous.

Hemicaranx. A single row of equal sized teeth in both jaws. Teeth on tongue. Vomer and palate edentulous.

† L. l. or lateral-line in this genus only refers to the number of keeled scales along its course.

6. *Caranx hippos*, D. 7-8 | $\frac{1}{19-22}$, A. 2 | $\frac{1}{14-17}$, L. l. 30-36. Height of body 1/3 to 3/10 of total length. Eye with a broad posterior adipose lid. Cleft of mouth commences anteriorly opposite the middle or lower third of eye. Second dorsal anteriorly $2\frac{1}{4}$ in the height of the body. Lateral-line curves to below the sixth dorsal ray. Chest scaled. A small dark spot on opercle at commencement of the lateral-line, upper angle of soft dorsal and tip of upper caudal lobe black. Red Sea, seas of India to the Malay Archipelago and beyond.

7. *Caranx sansun*, D. 8 | $\frac{1}{19-20}$, A. 2 | $\frac{1}{16-17}$, L. l. 30-32. Height of body 1/3 of total length. Eye with a narrow posterior adipose lid. Cleft of mouth commences anteriorly below the level of the eye. Second dorsal anteriorly $2\frac{1}{4}$ in the height of the body. Lateral-line curves to below sixth dorsal ray. Chest scaled. No opercular spot. Red Sea, seas of India.

d. No finlets, teeth in jaws in one or more rows, and of nearly equal size.

8. *Caranx gymnostethoides*, D. 8 | $\frac{1}{30-31}$, A. 2 | $\frac{1}{25-27}$, L. l. 22-25. Height of body 1/4 of total length. Eye with a narrow posterior adipose lid. Villiform teeth in the jaws. Second dorsal anteriorly 2/5 of the height of the body. Lateral-line curves to below 16th dorsal ray. Chest and breast as high as the pectoral scaleless. A dull opercular spot. Seas of India to the Malay Archipelago.

9. *Caranx ferdau*, D. 7-8 | $\frac{1}{24-28}$, A. 2 | $\frac{1}{22}$, L. l. 25. Height of body $3\frac{2}{3}$ to $4\frac{1}{4}$ in the total length. Eye with a narrow posterior adipose lid. Villiform teeth in the jaws. Second dorsal anteriorly 2/5 of the height of the body. Lateral-line curves to below the 13th dorsal ray. Chest in front of the ventral fin scaleless. No opercular spot. Red Sea and seas of India.

10. *Caranx crumenophthalmus*, D. 8 | $\frac{1}{24-26}$, A. 2 | $\frac{1}{21-22}$, L. l. 27-32. Height of body $4\frac{1}{2}$ to $4\frac{2}{3}$ in the total length. Eye with very broad anterior and posterior adipose lids. Teeth in a single row in both jaws. The arched portion of the lateral-line passes into the straight part below the tenth dorsal ray. Chest scaled. Usually no opercular spot. Red Sea, seas of India to the Malay Archipelago and beyond.

11. *Caranx boops*, D. 8 | $\frac{1}{24-25}$, A. 2 | $\frac{1}{20-21}$, L. l. 46. Height of body 1/4 of the total length. Eye with a broad posterior adipose lid. Teeth in a narrow band, or single row in both jaws. Lateral-line becomes straight below the sixth dorsal spine. Chest scaled. A small opercular spot. Andamans to the Malay Archipelago.

12. *Caranx Djedduba*, D. 8 | $\frac{1}{22-25}$, A. 2 | $\frac{1}{19-20}$, L. l. 46-53. Height of body $3\frac{1}{2}$ in the total length. Eye with a broad posterior adipose lid. Teeth in a single row in both jaws. Lateral-line becomes straight below the first dorsal ray. Chest scaled. A well-marked opercular spot. Red Sea, seas of India to the Malay Archipelago and beyond.

13. *Caranx affinis*, D. 7-8 | $\frac{1}{24}$, A. 2 | $\frac{1}{19-20}$, L. l. 42-47. Height of body $3\frac{3}{4}$ to $4\frac{1}{2}$ in the total length. Eye with a broad anterior and posterior adipose lid. Teeth in a narrow band anteriorly, a single row posteriorly. Lateral-line becomes straight below the seventh dorsal ray. Chest scaled. A well-marked opercular spot. Red Sea, seas of India to the Malay Archipelago and beyond.

14. *Caranx kalla*, D. 8 | $\frac{1}{23-24}$, A. 2 | $\frac{1}{19-20}$, L. l. 40-44. Height of body from 1/3 to 2/7 of the total length. Eye with a broad posterior adipose lid. Teeth in a single row in both jaws. Lateral-line becomes straight below the fifth dorsal ray. Chest sealed. A large opercular spot. Red Sea, seas of India to China.

15. *Caranx ire*, D. 8 | $\frac{1}{23-24}$, A. 2 | $\frac{1}{19-20}$, L. l. 26-28. Height of body $3\frac{2}{3}$ to 1/4 of the total length. Eye with a narrow posterior adipose lid. Teeth anteriorly in a villiform band in both jaws, in a single row laterally. Lateral-line becomes straight below the eighth dorsal ray. Chest sealed. No opercular spot. A black blotch at summit of soft dorsal fin. Seas of India to the Malay Archipelago.

16. *Caranx compressus*, D. 8 | $\frac{1}{22-24}$, A. 2 | $\frac{1}{19-20}$, L. l. 13. Height of body $3\frac{1}{4}$ to $3\frac{1}{2}$ in total length. Eye without adipose lids. Teeth in both jaws in villiform bands. Lateral-line becomes straight below the twelfth dorsal ray. Chest sealed. A small opercular spot. Red Sea, Andaman islands.

17. *Caranx atropus*, D. 8 | $\frac{1}{22}$, A. 2 | $\frac{1}{18}$, L. l. 32-35. Height of body 2/5 of total length. Eye without adipose lids. Teeth in two rows in either jaw. Second dorsal anteriorly 1/3 height of body. Lateral-line becomes straight below the fifth dorsal ray. Chest and breast scaleless. An opercular spot. Seas of India to the Malay Archipelago.

18. *Caranx Malabaricus*, D. 7-8 | $\frac{1}{21-22}$, A. 2 | $\frac{1}{17-18}$, L. l. 28. Height of body $2\frac{2}{3}$ in the total length. Eye without adipose lids. Teeth villiform in either jaw. Second dorsal fin anteriorly $2\frac{2}{3}$ in height of body. Lateral-line becomes straight below the thirteenth dorsal ray. Chest and breast scaleless. Red Sea, seas of India to the Malay Archipelago.

19. *Caranx oblongus*, D. 8 | $\frac{1}{22}$, A. 2 | $\frac{1}{18-19}$, L. l. 34-40. Height of body $3\frac{1}{4}$ in the total length. Eye without adipose lids. Teeth in villiform bands in upper, a single row in the lower jaw. Second dorsal anteriorly 3/4 height of body. Lateral-line becomes straight below ninth dorsal ray. Chest scaleless. No opercular spot.

20. *Caranx nigrescens*, D. 8 | $\frac{1}{19}$, A. $2\frac{1}{17}$, L. l. 23. Height of body 2/7 of the total length. Eye without adipose lids. Teeth in villiform rows in both jaws. Second dorsal anteriorly $1\frac{3}{4}$ in height of body. Lateral-line becomes straight below thirteenth dorsal ray. Breast and chest scaleless. An opercular spot. Andamans.

21. *Caranx armatus*, D. 6-8 | $\frac{1}{20-21}$, A. 2 | $\frac{1}{16-17}$, L. l. 20. Height of body 2/5 of the total length. Eye with a narrow posterior adipose lid. Teeth villiform in both jaws. Second dorsal anteriorly nearly as high as the body. Lateral-line becomes straight below the middle of the second dorsal. Breast and a portion of the chest scaleless. An opercular spot. Red Sea, seas of India to the Malay Archipelago.

22. *Caranx gallus*, D. 0-6 | $\frac{1}{19}$, A. 0-2 | $\frac{1}{16}$, L. l. 8-10. Height of body from $1\frac{3}{4}$ to 1/3 of the total length. Height of preorbital $1\frac{1}{3}$ to $1\frac{2}{3}$ in diameter of orbit. Eye without adipose lids. Teeth villiform in the young, obtuse in adults. Anterior rays of second dorsal and anal filiform and prolonged. Lateral-line becomes straight below twelfth dorsal ray. Scaleless except along lateral-line. A small opercular spot in adults. Red Sea, seas of India to the Malay Archipelago.

23. *Caranx ciliaris*, D. 6 | $\frac{1}{19}$, A. 2 | $\frac{1}{16}$, L. l. 15. Height of body $1\frac{1}{2}$ to $1\frac{3}{4}$ in the total length. Height of preorbital from 3/4 to 1 diameter of orbit. Eye without adipose lids. Teeth villiform in both jaws. Anterior rays of second dorsal and anal filiform and prolonged. Lateral-line becomes straight below tenth dorsal ray. Scaleless except along the lateral-line. An opercular spot. From the Red Sea, through those of India.

B. No teeth on the palate.

24. *Caranx leptolepis*, D. 8 | $\frac{1}{24\text{-}26}$, A. 2 | $\frac{1}{21}$, L. l. 24-28. Height of body $3\frac{2}{3}$ to $4\frac{1}{4}$ in the total length. Eye with a broad posterior and narrow anterior adipose lid. Teeth in a single row in both jaws. Second dorsal anteriorly $2\frac{1}{3}$ in height of body. Lateral-line becomes straight below seventh dorsal ray. Chest scaled. Seas of India to the Malay Archipelago.

25. *Caranx nigripinnis*, D. 7-8 | $\frac{1}{23\text{-}25}$, A. 2 | $\frac{1}{20\text{-}21}$, L. l. 55-60. Height of body 2/7 of the total length. Eyes with wide anterior and posterior adipose lids. Teeth in a single row in both jaws. Second dorsal anteriorly 1/3 height of body. Lateral-line becomes straight below fifth dorsal ray. Chest scaled. Seas of India.

26. *Caranx speciosus*, D. 7-8 | $\frac{1}{18\text{-}20}$, A. 2 | $\frac{1}{15\text{-}16}$, L. l. 13-15. Height of body $3\frac{1}{4}$ in the total length. Eyes without adipose lids. Teeth absent. Second dorsal anteriorly $2\frac{1}{3}$ in height of body. Lateral-line becomes straight below eighth dorsal ray. Chest scaled. Red Sea, seas of India to the Malay Archipelago.

A. Teeth on the palate.

a. Several finlets behind dorsal and anal fins.

1. Caranx Rottleri.

Scomber Rottleri, Bloch, x, p. 40, t. 346; Bl. Schn. p. 25; Shaw, Zool. iv, p. 598.

Scomber woragoo, Russell, Fish. Vizag. ii, p. 33, pl. 143.

?Scomber guara, Lacép. ii, p. 604.

Caranx Rotleri, Rüpp. Atl. p. 102, and N. W. Fische, pp. 48 and 52; Cuv. and Val. ix, p. 29; Richards. Ich. China, p. 273.

Caranx Rottleri, Cantor, Catal. p. 124; Jerdon, M. J. L. and Sc. 1851, p. 136; Günther, Catal. ii, p. 424; Day, Fishes of Malabar, p. 80; Kner, Novara Fische, p. 150; Klunz. Verh. z. b. Ges. Wien, 1871, p. 453.

Megalaspis Rottleri, Bleeker, Makr. p. 49.

Sora parah, Tel.: *Komara parah*, Tam.

B. vii, D. 6-8 | $\frac{1}{9\text{-}11}$ + viii-x, P. 21, V. 1/5, A. 2 | $\frac{1}{8\text{-}9}$ + vii-viii, C. 18, L. l. 55.*

Length of head $4\frac{2}{3}$ to $5\frac{1}{4}$, of caudal $5\frac{1}{2}$, height of body $4\frac{1}{4}$ to $4\frac{2}{3}$ in the total length. *Eye*—with a broad anterior and posterior adipose lid, both covering a portion of the pupil: diameter of eyes from $3\frac{1}{2}$ to $4\frac{1}{2}$ in the length of the head, 1 to $1\frac{1}{4}$ diameters from end of snout, and 1 apart. There is a very gradual ascent from the snout to the first dorsal fin, and the dorsal and abdominal profiles are about equally convex. The greatest width of the head equals 4/7 of its length, and its height its length behind the front nostril. Cleft of mouth very slightly oblique, commencing opposite the lower edge of the eye, lower jaw slightly the longer and the maxilla reaches to below the middle of the eye. The greatest depth of the preorbital equals about 1/2 the diameter of the orbit. *Teeth*—villiform in the upper jaw, with an outer row of rather widely separated and slightly conical ones: in the lower jaw two or three rows above the symphysis and a single lateral one. In a triangular patch on the vomer, in a long elliptical band on the palatines, and a wide one along the tongue. *Fins*—spines of first dorsal of moderate strength, the third to the fifth highest and equal to 2/5 of the height of the body: second dorsal highest anteriorly where it equals from $1\frac{2}{3}$ to about 1/2 the height of the body. Posteriorly it has from eight to ten detached rays. Pectoral falciform and longer than the head, reaching to about the 20th plate on the lateral-line. Ventral reaches rather above 1/2 way to the pre-anal spines. Anal similar in form to the second dorsal but rather lower and having from 7 to 8 free rays posterior to it. Caudal deeply forked. *Scales*—consist of about 78 rows, 55 of which are large plates. They are on the cheeks, upper edge of opercle, and top of head, there is only a narrow band in the central line in front of the ventral fin, otherwise the chest in front of it is scaleless: they also form a low sheath over the bases of the soft dorsal and anal fins. *Lateral-line*—at first makes a strong curve, the height of which equals half its length, it becomes straight below the middle of the first dorsal fin where wide plates commence, the highest equalling from 1/2 to 2/5 of the height of the body, they are most strongly keeled over the free portion of the tail which is strongly depressed. *Colours*—back glossy-green, abdomen silvery tinged with yellow: a large black spot on the upper and posterior portion of the opercle. Fins yellow, dorsal and anal tipped with black: upper half of pectoral darker than the lower.

In a young specimen $1\frac{7}{10}$ inches in length the angle and lower edge of the preopercle are crenulated, and crenulations are still visible in one 4 inches long.

* L. l. or lateral-line in this genus only refers to the number of keeled scales along its course.

Habitat.—From the Red Sea and East coast of Africa, through the seas of India to the Malay Archipelago and beyond. It is said by fishermen to attain 5 feet in length.

b. A single finlet behind dorsal and anal fins.

2. Caranx kurra, Plate XLVIII, fig. 5.

Scomber, Russell, Fish. Vizag. ii, p. 30, and *Kurra wodagawah*, pl. 139.
Caranx Russellii, Rüpp. Atl. Fische, p. 99.
Caranx kurra, Cuv. and Val. ix, p. 44; Jerdon, M. J. L. and Sc. 1851, p. 137; Günther, Catal. ii, p. 427; Day, Fishes of Malabar, p. 81; Klunz. Verh. z. b. Ges. Wien, 1871, p. 453.
Caranx pseudopterygius, Bleeker, Makr. p. 50.
? Caranx kiliche, Cuv. and Val. ix, p. 43.
Decapterus kurra, Bleeker, Makr. p. 50, and Nat. Tyds. Ned. Ind. 1851, p. 358.

B. vii, D. 8 | $\frac{1}{29-30}$ + i, P. 22, V. 1/5, A. 2 | $\frac{1}{25-27}$ + i, C. 17, L. l. 33.

Length of head $3\frac{3}{4}$ to 1/4, of pectoral 1/5, of caudal 1/6, height of body 1/5 to 2/11 of the total length. *Eye*—with a broad anterior and posterior adipose lid, each of which reaches nearly or quite to the pupil: diameter ef the eyes 1/4 of length of head, 1 diameter from end of snout and also apart. Greatest width of the head equals 1/2, and its height 4/5 of its length. Lower jaw the longer, the cleft of the mouth commences opposite the middle of the orbit, the maxilla reaches to below the front edge of the eye. The greatest height of the preorbital equals 1/2 the diameter of the orbit, it has three or four well marked raised ridges radiating from its centre. *Teeth*—villiform in both jaws, becoming a single row laterally, in a triangular spot on the vomer, having a narrow row posteriorly in the median line, a row on either palatine, and in three rows along the middle of the tongue. *Fins*—spines of first dorsal weak, the third longest and equal to 3/5 of the height of the body: anterior portion of the second dorsal the highest where it equals 2/5 of that of the body, posteriorly it has a detached ray: anal similar to second dorsal. Ventral reaches nearly half way to the base of the anal. Caudal forked. *Scales*—on the upper surface of the head, cheeks, and opercles, also all over the body including the chest. A low sheath along the second dorsal and anal fins. *Lateral-line*—consisting of 88 scales, it continues nearly straight until opposite the end of the first dorsal where it gradually descends, and below the 15th ray it goes direct to the centre of the tail. The keeled scales at first are moderately so, the broadest equals from 1/5 to 2/11 of the height of the body. Free portion of the tail as high at its base as it is long. *Colours*—bluish superiorly, becoming silvery below. A deep black spot on the upper margin of the opercle: upper surface of head minutely dotted with black. Fins yellow, darkest at their edges.

Caranx kiliche, Cuv. and Val. from Pondicherry, is probably this species: its fin rays are D. 8 | $\frac{1}{27}$ + i, A. 2 | $\frac{1}{25}$ + i, L. l. 30. The teeth are not referred to. Klunzinger observes that the type of *C. Russellii* is not in the Senkenberg Museum. Amongst Sir Walter Elliot's figures of Madras fishes is this species, termed *Moonda kun kilchi*, Tam.

Habitat.—From the Red Sea, throughout those of India to the Malay Archipelago. It is a small species, attaining 6 or 7 inches in length: it arrives in Madras about October.

c. No finlets. Outer row of teeth in premaxillaries distinctly enlarged: a single row in the lower jaw, often with 2 or 4 canines.

3. Caranx melampygus, Plate L, fig. 3.

Scomber, Russell, Fish. Vizag. ii, p. 34, and *Kuroogoo parah*, pl. 145.
Caranx melampygus, Cuv. and Val. ix, p. 116; Bleeker, Gilolo, p. 58; Jerdon, M. J. L. and Sc. 1851, p. 137; Günther, Catal. ii, p. 446.
Carangus melampygus, Bleeker, Madagas. 1871, p. 99.

B. vii, D. 8 | $\frac{1}{21-23}$, P. 22, V. 1/5, A. 2 | $\frac{1}{17-19}$, C. 19, L. l. 34-36.

Length of head from $4\frac{1}{4}$ to $4\frac{1}{2}$, of caudal 1/4 to $4\frac{1}{2}$, height of body 2/7 of the total length. *Eye*—with a broad posterior adipose lid, extending 2/3 of the distance across the iris, diameter of eyes $3\frac{3}{4}$ to $4\frac{1}{3}$ in length of head, $1\frac{1}{3}$ diameters from end of snout, and 1 apart. Dorsal profile rather more convex than that of the abdomen. The greatest width of the head equals about 1/2, and its height its entire length. Lower jaw slightly the longer. Cleft of mouth commences opposite the lower third of the eye, the maxilla reaches to below the middle of the orbit. The greatest width of the preorbital nearly equals one diameter of the eye. *Teeth*—in a villiform band in the premaxillaries having an outer row of conically enlarged ones, a single row in the lower jaw, also present on vomer, palatines, and tongue. *Fins*—dorsal spines of moderate strength, the third the highest and equal to 1/3 that of the body: soft dorsal having its anterior rays elongated, and equal to 2/3 of the height of the body: anal similar to it but rather lower. Pectoral falciform and equal to 2/7 of the total length. Caudal deeply forked. *Scales*—on upper margin of head, cheeks, chest, and body: a low sheath along the bases of the soft dorsal and anal fins. *Lateral-line*—consists of 90 to 95 rows of scales, at first it slightly ascends, then curves to below the 6th or 8th dorsal ray, the height of the arch is not quite 1/4 of its length: it has keeled scales along most of its straight portion, the highest of which eqnals 1/8 or 1/9 of that of the body. Free portion of the tail half higher at its base than it is long. *Colours*—greenish gold along the back, becoming silvery along the abdomen: a small black spot on the opercle: dorsal and anal fins dark anteriorly.

In one specimen about 13 inches in length, from the Andamans, there are small scattered black spots over the body.

Habitat.—Seas of India to the Malay Archipelago and beyond. The largest specimen I have seen is 2 feet in length. The one figured (8 inches long) is from the Andamans.

4. Caranx jarra.

Scomber, Russell, Fish. Vizag. ii, p. 35, and *Jarra-dandrée parrah*, pl. 147.

Caranx jarra, Cuv. and Val. ix, p. 109; Bleeker, Makr. p. 58; Jerdon, M. J. L. and Sc. 1851, p. 137; Günther, Catal. ii, p. 446.

B. vii, D. 8 | $\frac{1}{22}$, P. 21, V. 1/5, A. 2 | $\frac{1}{18}$, C. 18, L. l. 33-36.

Length of head $4\frac{1}{3}$, of caudal $4\frac{1}{3}$, height of body $3\frac{2}{3}$ in the total length. *Eye*—with a broad posterior adipose lid extending 2/3 of the distance across the iris, diameter of eye $4\frac{2}{3}$ in length of head, $1\frac{1}{2}$ diameters from end of snout, and rather above 1 apart. Dorsal profile a little more convex than that of the abdomen, the ascent from the snout to occiput rather abrupt. Greatest width of the head equals half, and its height almost equals its entire length. Cleft of the mouth commences opposite the lower edge of the eye, the jaws are of about the same length anteriorly, the maxilla reaches to below the middle of the orbit. The greatest height of the preorbital equals 1 diameter of the eye. *Teeth*—villiform in the premaxillaries, with an external conically enlarged row: villiform in the lower jaw, on the vomer, palatines, and tongue. *Fins*—dorsal spines increase to the third which equals $2\frac{2}{3}$ in the height of the body: the first few rays of the second dorsal elevated, the highest being equal to $1\frac{2}{3}$ in that of the body. Pectoral falciform, its length equal to 3/10 of that of the total. Ventral reaches 1/2 way to the anal. Anal similar to soft dorsal, its first few rays 1/2 as high as the body. Caudal forked. *Scales*—cover the cheeks, upper portion of the opercles and behind the eyes, but none exist along the median longitudinal crest on the head, which is well developed. Present over the body, but absent from the chest in front of the base of the ventral fins. They form a distinct sheath to the bases of the soft dorsal and anal fins. *Lateral-line*—consisting of 90 scales, in its first half it forms a low, undulating arch, which terminates below the seventh dorsal ray, the height of the arch equals 2/9 of the length of its base. The keeled scales begin at the commencement of the straight portion of the lateral-line, becoming largest below the end of the second dorsal, where they equal 1/9 of the height of the body. Free portion of the tail 2/3 as high at its base as it is long. *Colours*—greenish above, becoming of a dull white on the sides and below. No opercular spot.

This species is termed *Korandilli parah*, Tam., in Sir W. Elliot's collection of drawings of Indian Fishes.

Habitat.—Seas of India to the Malay Archipelago, attaining at least a foot in length.

5. Caranx carangus, Plate L, fig. 4.

Scomber carangus, Bl. t. 340; Bl. Schn. p. 28.

Scomber ekala parah, Russell, Fish. Vizag. ii, p. 35, pl. 146.

Caranx carangus, Cuv. and Val. ix, p. 91; Günther, Catal. ii, p. 448; Kner, Novara Fische, p. 157; Steind. Ak. d. Wiss. 1869, p. 36.

Caranx chrysos, Cuv. and Val. ix, p. 117.

Caranx ekala, Cuv. and Val. ix, p. 117; Bleeker, Makr. p. 59; Day, Fish. Malabar, p. 86.

Caranx xanthopygus, Cuv. and Val. ix, p. 109.

Trachurus cordyla, Gronov. ed. Gray, p. 124.

B. vii, D. 8 | $\frac{1}{20-22}$, P. 21, V. 1/5, A. 2 | $\frac{1}{15-18}$, C. 19, L. l. 33-37.

Length of head $4\frac{1}{3}$, of caudal $4\frac{3}{4}$, height of body one-third in the total length. *Eye*—with a narrow posterior adipose lid, diameter 2/7 of length of head, 1 diameter from end of snout, and also apart. Dorsal profile rather more convex than that of the abdomen. Greatest width of head nearly equals 1/2 its length, and its height rather more than its length. Lower jaw slightly the longer, the cleft of the mouth commences opposite the lower 1/3 of the front edge of the eye, the maxilla extends to beneath the middle of the eye. Central longitudinal crest on the head well-developed. Greatest height of the preorbital equals 2/3 of the diameter of the eye. The lower edges of the sub- and inter- opercles more or less crenulated. *Teeth*—villiform in the premaxillaries, with an outer enlarged and conical row: a single row in the lower jaw, some of which are larger than the others: in a triangular spot on the vomer, a band on the palatines, and also along the middle of the tongue. *Fins*—dorsal spines of moderate strength, the third the longest, and equal to 1/3 of the height of the body, or 3/4 that of the anterior dorsal rays. Pectoral slightly longer than the head. Ventral does not reach 1/2 way to the anal. Caudal rather deeply forked. *Scales*—a few round the eye on the hind portion of the opercle, on the body, in a patch in front of the ventral fins, but usually none anterior to the base of the pectoral or below its anterior half, the skin however is puckered and wrinkled into little pits, and occasionally the scales extend half-way to between the ventral and anal fins. *Lateral-line*—containing 90 to 95 scales, the arched portion terminates rather abruptly below the third or fifth dorsal ray, the height of the arch equals 3/10 of the length of its base, whilst that of its base equals 3/5 that of the straight portion. Keeled scales commence at the beginning of the straight portion, becoming well developed below the last third of the second dorsal, where they equal 1/8 to 1/9 of the height of the body. Free portion of the tail rather longer than high at its base. *Colours*—silvery along the back, golden on the sides and below. Four or five

broad vertical bands on the body in immature specimens. Fins golden, except the first dorsal, which is gray, the tip, and sometimes the entire upper edge of the second dorsal and end of the upper lobe of the caudal black. Usually no opercular spot in Indian specimens, and when present mostly small.

Habitat.—Seas of India, Malay Archipelago to the Atlantic coasts of tropical America: the specimen figured ($5\frac{3}{5}$ inches long) is from Madras where they attain a large size.

6. Caranx hippos.

Scomber hippos, Linn. Syst. Nat. i, p. 494; Bl. Schn. p. 28; Forster, Desc. Anim. ed. Licht. p. 190.

Scomber Kleinii, Bl. t. 347, f. 2; Bl. Schn. p. 30.

Scomber wotim parah, Russell, ii, p. 36, pl. 148.

Caranx sem, Cuv. and Val. ix, p. 105; Jerdon, M. J. L. and Sc. 1851, p. 137.

Caranx Forsteri, Cuv. and Val. ix, p. 107; Cantor, Catal. p. 127; Bleeker, Makr. p. 57, and Nat. Tyds. Ned. Ind. 1852, iii, p. 164; Kner, Novara Fische, p. 158.

Caranx sexfasciatus, Quoy and Gaim. Voy. Freyc. p. 358, pl. 65, f. 4; Cuv. and Val. ix, p. 110 (*young*).

Caranx Peronii, Cuv. and Val. ix, p. 112.

Caranx Lessonii and *Belengeri*, Cuv. and Val. ix, pp. 113, 116.

Caranx hippos, Günther, Catal. ii, p. 449; Day, Fishes of Malabar, p. 86; Klunz. Verh. z. b. Ges. Wien, 1871, p. 465.

Carangus hippos, Bleeker, Waigou, 1868, p. 3.

B. vii, D. 7-8 | $\frac{1}{19-22}$, P. 22, V. 1/5, A. 2 | $\frac{1}{14-17}$, C. 21, L. l. 30-36.

Length of head 1/4, of caudal 2/9, height of body 1/3 to $3\frac{1}{3}$* in the total length. *Eye*—with a posterior adipose lid reaching half way or two-thirds of the distance to the pupil, diameter 3/11 of length of head, 1 diameter from end of snout, and also apart. Dorsal and abdominal profiles about equally convex and forming a gradual slope. Greatest width of head equals 1/2 its length, and its height equals nearly its length. Lower jaw slightly the longer, the cleft of the mouth commences opposite the middle or lower third of the front edge of the eye, the maxilla reaches to below the last third of the orbit. Greatest height of preorbital equals 1/2 the diameter of the eye. *Teeth*—villiform, with an outer enlarged row in the premaxillaries: in a single row in the lower jaw, amongst which occasionally are a few larger ones, a pair of well-marked canines above the symphysis: in a triangular patch on the vomer, in a band on the palatines, also along the tongue. *Fins*—the third dorsal spine the longest and equal from 1/3 to $3\frac{1}{4}$ in the height of the body: the anterior dorsal rays equal to $2\frac{1}{4}$ in the height of the body. Pectoral 1/5 longer than the head. Anal similar to, but lower than, the second dorsal. Caudal deeply forked. *Scales*—on cheeks, body, and chest. *Lateral-line*—consisting of 80 scales, forms an arch, 1/3 as high as long, ending below the sixth dorsal ray, the length of the arch equalling 2/3 of that of the straight portion: keeled plates extend the whole distance along the horizontal portion of the lateral-line, the largest being below the last portion of the second dorsal fin, and equal 1/10 of the height of the body. *Colours*—body golden, having a tinge of gray along the back. A small black spot on the opercle just before the commencement of the lateral-line. Fins yellow, summit of second dorsal and point of the upper caudal lobe deep black, sometimes the whole of the posterior border of the caudal fin is black edged. Eyes, bright orange. Usually a dark spot behind the base of the pectoral fin. The *young* are golden, with four or five broad vertical bands on the body.

Caranx Heberi, Benn. Fish. Ceylon (p. 26, pl. xxvi.) is probably this species: if so the mouth is shown too low down.

Habitat.—Seas of India to the Malay Archipelago, China, and beyond. It attains a large size, as 3 feet or more in length. When captured it grunts like a young pig, and this is repeated whenever it is moved, so long as vitality remains.

7. Caranx sansun, Plate L, fig. 5.

Scomber sansun, Forsk. p. 56.

Scomber gundi-parah, Russell, ii, p. 33, and pl. 144.

Caranx sansun, Rüpp. Atl. Fische, p. 101, and N. W. Flsche, p. 48, t. xiii, f. 3; Günther, Catal. ii, p. 447; Klunz. Verh. z. b. Ges. Wien, 1871, p. 446.

Carangus sansun, Bleeker, Fauna de Madag. 1874, p. 99.

B. vii, D. 8 | $\frac{1}{19-20}$, P. 20, V. 1/5, A. 2 | $\frac{1}{16-17}$, C. 19, L. l. 30-32.

Length of head 1/4, of caudal 1/4 to 2/9, height of body 1/3 of the total length. *Eye*—with a narrow posterior adipose lid, diameter $3\frac{3}{4}$ in the length of head, 1 to $1\frac{1}{4}$ diameters from end of snout, and 1 apart. Dorsal profile more convex than that of the abdomen, the profile of the anterior surface of the head somewhat obtuse. The greatest width of the head equals 4/9 of its length, and its height its entire length. Lower jaw a little the longer, the cleft of the mouth commences below the level of the orbit, the maxilla reaches to below the last third of the eye. Greatest depth of preorbital equals 3/4 in the young to $1\frac{1}{2}$ in the adult diameters of the eye. *Teeth*—villiform, with an outer row of enlarged but irregularly sized ones in the premaxillaries, in a single row of irregularly sized ones in the lower jaw, some being much larger than the others, and a pair of minute canines at the symphysis: in a triangular spot on the vomer, in a band on the palatines and in a narrow patch

* In a specimen $1\frac{6}{10}$ inches long, the height of the body equals 2/5 of the total length.

along the middle of the tongue. *Fins*—third dorsal spine the highest, equalling 1/3 of that of the body and 2/3 as high as the commencement of the second dorsal. Pectoral 1/4 longer than the head. Ventral reaches nearly 1/2 way to the anal. Caudal deeply forked. *Scales*—on body, chest, and cheeks. *Lateral-line*—consisting of ninety-five scales, its arched portion ending below the sixth dorsal ray, the height of the arch being equal to 1/4 of its length, and its length equal to $1\frac{1}{3}$ or $1\frac{1}{2}$ in the straight portion. Keeled scales commence about the third scale of the horizontal portion, becoming well developed beneath the last part of the soft dorsal, where their height equals 1/8 to 1/9 of that of the body. Free portion of the tail longer than high at its base. *Colours*—silvery along the back, becoming golden below, all the fins yellow, first dorsal grayish. No opercular spot.

Habitat.—Red Sea, seas of India. The specimen figured ($6\frac{2}{5}$ inches long) is from Madras. Russell's specimen was 1 foot long, and he says that it is a dry, insipid fish.

d. No finlets. Teeth in jaws in one or more rows of nearly equal size.

8. Caranx gymnostethoides, Plate XLVIII, fig. 6.

? *Caranx gymnostethus*, Cuv. and Val. ix, p. 73.
Carangoides gymnostethoides, Bleeker, Makr. p. 365.
Caranx gymnostethoides, Günther, Catal. ii, p. 431 ; Kner, Novara Fische, p. 153.

B. vii, D. 8 | $\frac{1}{30-31}$, P. 21, V. 1/5, A. 2 | $\frac{1}{25-27}$, C. 17, L. l. 22-25.

Length of head 1/4, of caudal 2/9, height of body 1/4 of the total length. *Eye*—with a narrow posterior adipose lid, diameter $5\frac{1}{4}$ in length of head, 2 diameters from end of snout, and $1\frac{3}{4}$ apart. Abdominal profile rather more convex than the dorsal, a slight rise from the snout to the base of the first dorsal fin. Greatest width of head equals half its length, and its height equals its length posterior to the nostrils. Lower jaw somewhat the longer. Cleft of the mouth commences opposite the middle of the eyes, the maxilla reaches to nearly below the front edge of the orbit. The preorbital in its deepest part equals 1 diameter of the orbit. *Teeth*—villiform in both jaws, on the vomer, palatines, and along the middle of the tongue. *Fins*—dorsal spines not strong, the third and fourth the longest and equal to 2/7 of the height of the body : the first portion of the soft dorsal the highest, and equal to 2/5 of that of the body. Pectoral rather longer than the head. Anal similar to soft dorsal. Caudal forked. *Scales*—extended over the cheeks and body, but none on the chest from below the pectoral fin. *Lateral-line*—at first makes a long, low curve to below the 16th dorsal ray, the length of the arch equals that of the straight portion, the height of the more developed plates equals 1/14 of that of the body. Free portion of the tail 2/3 as high at its base as it is long. *Colours*—greenish along the back, becoming dull silvery-white below : an indistinct opercular spot present. Soft dorsal and anal stained with black in their highest portions.

Habitat.—Seas of India to the Malay Archipelago. The largest specimen in the Madras Museum is 28 inches in length. The one figured is 17 inches long and from Madras.

9. Caranx ferdau.

Scomber ferdau, Forsk. p. 55.
Caranx bajad, Rüpp. Atl. Fische, p. 98, t. 25, f. 5; Günther, Catal. ii, p. 438.
Caranx fulvoguttatus, Cuv. and Val. ix, p. 73.
Carangoides fulvoguttatus, Bleeker, Makr. p. 89.
Caranx ferdau, Klunz. Verh. z. b. Ges. Wien, 1871, p. 462 (not Rüppell or Günther).

B. vii, D. 7-8 | $\frac{1}{24-28}$, P. 21, V. 1/5, A. 2 | $\frac{1}{22}$, C. 17, L. l. 25.

Length of head $4\frac{1}{4}$, of caudal 1/5, height of body $3\frac{2}{3}$ to $4\frac{1}{4}$ in the total length. *Eye*—with a narrow posterior adipose lid, diameter from $4\frac{1}{2}$ to $4\frac{3}{4}$ of length of head, $1\frac{1}{4}$ to 2 diameters from end of snout. Dorsal and abdominal profiles about equally convex, a slight ascent from the snout to the base of the dorsal fin. Height of head equals its length. Cleft of mouth commences opposite the middle of the front edge of the eyes, jaws of about equal length : the maxilla reaches to below the middle of the orbit. Greatest height of preorbital equals 3/4 of a diameter of the orbit. *Teeth*—villiform in both jaws, on vomer, and palate, tongue scabrous. *Fins*—spines of first dorsal increase in length to the third which equals 2/7 in the height of the body : the anterior portion of the second dorsal equals 2/5 the height of the body. Pectoral falciform and equal to $3\frac{1}{3}$ in the total length. Anterior portion of the anal commences below the seventh dorsal ray, and is as high as the first portion of that fin. Caudal deeply forked. *Scales*—in 140 rows, present on cheeks, upper portion of opercle, behind the eyes, also on the body, but not on the chest in front of the base of the ventral fin. A scaly sheath along bases of soft dorsal and anal fins. *Lateral-line*—in its first half makes a long low curve to below the 13th dorsal ray, the height of the arch being equal to 1/5 or 1/6 of its length. The keeled scales developed below the end of the second dorsal fin. *Colours*—greenish along the back, the young having five transverse oval spots or bars on the side of the body. No opercular spot.

Habitat.—Red Sea, East coast of Africa, seas of India to the Malay Archipelago.

10. Caranx crumenophthalmus, Plate XLIX, fig. 1.

Scomber crumenophthalmus, Bloch, t. 343.
Scomber balantiophthalmus, Bl. Schn. p. 29.

Caranx crumenophthalmus, Lacép. iv, p. 107; Cuv. and Val. ix, p. 62; Günther, Catal. ii, p. 429.

Caranx macrophthalmus, Rüpp. Atl. Fische, p. 97, t. 25, f. 4; Klunz. Verh. z. b. Ges. Wien, 1871, p. 458.

Caranx Mauritianus, Quoy and Gaim. Voy. Freyc. Zool. p. 359; Cuv. and Val. ix, p. 60.

Caranx torvus, Jenyns, Voy. Beagle, Fishes, p. 69, pl. 15; Günther, Catal. ii, p. 431; Kner, Novara Fische, p. 152.

Selar torvus, Bleeker, Makr. p. 51.

B. vii, D. 8 | $\frac{1}{24-26}$, P. 21, V. 1/5, A. 2 | $\frac{1}{21-22}$, C. 21, L. l. 27-32.

Length of head $3\frac{3}{4}$ to 1/4, of caudal 1/5 to $5\frac{1}{4}$, height of body $4\frac{1}{2}$ to $4\frac{2}{3}$ of the total length. *Eye*—with a broad posterior and also anterior adipose lid, diameter 1/3 to $3\frac{1}{4}$ in the length of head, 1 diameter from end of snout, and 3/4 of a diameter apart. Dorsal and abdominal profiles about equally convex. The greatest width of the head equals nearly half its length: its height is rather greater than its length excluding the snout. Lower jaw the longer: the cleft of the mouth commences opposite the upper third of the orbit: the maxilla reaches to below the first third of the eye. Height of the preorbital scarcely equals the diameter of the eye. *Teeth*—a single row in both jaws, in a Λ-shaped band on the vomer, a narrow one on the palatines, also along the centre of the tongue. *Fins*—dorsal spines weak, the third and fourth the longest, equal to 1/2 or 3/5 the height of the body and rather more than the rays at the commencement of the soft dorsal fin, of which the last is thickened and slightly prolonged. Pectoral $4\frac{3}{4}$ in the length of the body, not being so long as the head. Ventral reaches half way to the anal fin. Caudal rather deeply forked. *Scales*—on body, chest, and cheeks. *Lateral-line*—88 scales, forming a very long, low arched portion running into the straight part below the tenth dorsal ray, but the keeled scales do not commence until under the middle of that fin, becoming strongest under its termination, where they equal 1/8 to 1/10 the height of the body, in the arched portion of the lateral-line they are rounded and plate-like. Free portion of the tail nearly as high at its base as it is long. *Colours*—silvery, becoming golden below: usually no opercular spot, but present in some specimens from Madras, Fins golden, with fine dots. Caudal tipped with black.

Habitat.—Red Sea, seas of India to the Malay Archipelago, and also found in West Africa and Atlantic coasts of Tropical America, attaining at least 12 inches in length. The specimen figured is 8 inches long and from the Andamans.

11. **Caranx boops**, Plate XLIX, fig. 2.

Cuv. and Val. ix, p. 46; Günther, Catal. ii, p. 431; Bleeker, Obi, 1868, p. 5.

Selar boops, Bleeker, Makr. p. 51.

B. vii, D. 8 | $\frac{1}{24-25}$, P. 19, V. 1/5, A. 2 | $\frac{1}{20-21}$, C. 17, L. l. 46.

Length of head $3\frac{3}{4}$ to 1/4, of caudal 2/9, height of body 1/4 of the total length. *Eye*—with a broad posterior adipose lid and a narrower anterior one, diameter $2\frac{3}{4}$ to 1/3 of length of head, 3/4 to 1 diameter from end of snout, and rather less apart. Snout pointed: lower jaw rather the longer: commencement of cleft of mouth on a level with the middle of eye: the posterior extremity of the maxilla reaches to below the centre of the orbit: interorbital space nearly flat: preorbital narrow, its height in its deepest part being equal to 2/5 or 1/2 of that of the orbit. Dorsal and abdominal profiles equally convex: the width of the head equalling half its length. Lower edge of pre- sub- and interopercles roughened. *Teeth*—in a narrow band or single row on both jaws: in a Λ-shaped patch on the vomer, in a band on the palate, and also on the tongue. *Fins*—dorsal spines weak, the third and fourth the longest, equal to rather more than half the height of the body at the commencement of the second dorsal fin: anterior portion of second dorsal rather the highest, but a little lower than the longest dorsal spines. Pectoral not quite so long as the head: ventral reaches nearly 2/3 of the way to the anal, which latter fin is similar to but rather lower than the soft dorsal. Caudal deeply forked. *Scales*—over body, chest, cheeks, and upper jaw: a very low sheath on bases of soft dorsal and anal fins. *Lateral-line*—with 69 rows of scales, forming a rather strong curve anteriorly and becoming straight below the sixth dorsal spine, where the plates immediately begin to be developed. they are large and 1/4 of the height of the body in their broadest part. Free portion of the tail not quite so high at its base as it is long. *Colours*—silvery, darkest along the back, and shot with gold along the abdomen: a small but well developed opercular spot: dorsal and caudal fins with dark spots.

Habitat.—Andamans, (where the specimen figured, $7\frac{1}{4}$ inches in length, was captured) to the Malay Archipelago.

12. **Caranx Djeddaba**, Plate XLIX, fig. 3.

Scomber Djeddaba, Forsk. p. 56.

Caranx Djeddaba, Rüpp. Atl. p. 97, pl. xxv, fig. 3; Cuv. and Val. ix, p. 51; Günther, Catal. ii, p. 432; Klunz. Verh. z. b. Ges. Wien, 1871, p. 458.

Caranx vari, Cuv. and Val. ix, p. 48; Cantor, Catal. p. 125.

Selar Kuhlii, Bleeker, Makr. p. 361.

Selar vari, Bleeker, Beng. en Hind. p. 44.

Caranx xanthurus, Kner, Novara Fische, p. 154 (not C. and V.).

B. vii, D. 8 | $\frac{1}{22-25}$, P. 21, V. 1/5, A. 2 | $\frac{1}{19-20}$, C. 17, L. l. 46-53.

Length of head $4\frac{2}{3}$ to 1/5, of caudal $4\frac{3}{4}$, height of body $3\frac{1}{2}$ in the total length. *Eye*—having a broad posterior adipose covering, extending on to the pupil in the adult; diameter of eyes 1/4 to 2/9 of length of head, 1 to $1\frac{1}{4}$ diameters from end of snout, and $1\frac{1}{2}$ apart. Dorsal and abdominal profiles about equally convex.

Greatest width of head equals 3/5 of its length, whilst its height is nearly equal to its length. Lower jaw a little the longer: cleft of the mouth commences opposite the centre of the orbit: the maxilla reaches to below the first third of the eye. Depth of preorbital equal to 2/3 of the diameter of the eye. Central crest along the head well developed. *Teeth*—a fine row of pointed ones in either jaw, a triangular patch on the vomer, a narrow band along the palatines, also a bony plate on the centre of the tongue, which is finely toothed. *Fins*—dorsal spines of moderate strength, the third a little the longest and equal to 4/11 or 1/3 of the height of the body, and nearly as high as the anterior rays of the second dorsal. Pectoral falciform, equal to 1/4 or 2/7 of the entire length of the fish, and reaching to below the tenth or twelfth dorsal ray: ventral reaches half way to the anal. Anal commences under the third or fourth dorsal ray. Caudal deeply forked. *Scales*—over body, chest, cheeks, and above the hind third of the eye, also forming a well developed sheath to both the dorsal and anal fins. *Lateral-line*—with 86 to 90 scales, strongly curved anteriorly, becoming straight below the first dorsal ray, the height of its arch equals about 1/3 of its length: the length of its arch is $2\frac{1}{4}$ in that of the straight part: keeled plates commence on the first scale of the straight portion, becoming most developed below the last third of the second dorsal fin, where they equal 1/8 to 1/9 of the height of the body. Free portion of the tail about twice as long as it is deep at its base. *Colours*—silvery blue along the back, becoming golden on the sides and below: a large black blotch on the opercle at its posterior-superior angle. Fins yellow, the first dorsal tinged with gray, as is also the upper edge of the second dorsal, except its most elevated portion which is white: upper lobe of caudal darker than the lower. In a specimen over 13 inches in length, the summit of the soft dorsal is white and the rest of the fin black: the first dorsal is dark: the anal has a black spot at the base of its first six rays.*

Habitat.—Red Sea, East coast of Africa, seas of India to the Malay Archipelago and beyond. It is common in Madras and considered fair eating: it attains at least 13 inches in length.

13. Caranx affinis, Plate XLIX, fig. 4.

Caranx affinis, Rüpp. N. W. Fische, p. 49, t. xiv, f. 1; Kner, Novara Fische, p. 151; Klunz. Verh. z. b. Ges. Wien, 1871, p. 459.

Caranx mate, Cuv. and Val. ix, p. 54; Cantor, Catal. p. 125; Day, Fishes of Malabar, p. 82.

Caranx xanthurus, (Kuhl. and v. Hass.), Cuv. and Val. ix, p. 55; Günther, Catal. ii, p. 434; Bleeker, Bintang, 1868, p. 5.

Selar Hasseltii, Bleeker, Makr. p. 360.

Caranx Hasseltii, Günther, Catal. ii, p. 430.

B. vii, D. 7-8 | $\frac{1}{24}$, P. 24, V. 1/5, A. 2 | $\frac{1}{19-20}$, C. 17, L. l. 42-47, Cæc. pyl. 20.

Length of head $4\frac{1}{2}$, of caudal $5\frac{1}{3}$, height of body $3\frac{3}{4}$ to $4\frac{1}{4}$ in the total length. *Eye*—with a broad anterior and posterior adipose lid, both reaching the pupil; diameter 1/4 of length of head, rather more than 1 diameter from end of snout, and $1\frac{1}{3}$ apart. Dorsal and abdominal profiles about equally convex, snout rather pointed. Lower jaw the longer: the maxilla reaches to below the front edge or first third of the orbit. Interorbital space with a raised ridge along its centre. Greatest width of head equals rather more than half its length: its height equals its length behind the posterior nostril. Preorbital in its deepest part, equal to nearly 1 diameter of the orbit. *Teeth*—villiform and in more than one row at symphysis of either jaw, laterally in a single row of moderately large ones: in a Λ-shaped or lozenge-shaped patch on vomer, also on the palatines, and in a very narrow band along the centre of the tongue. *Fins*—fourth dorsal spine rather the longest, and equal to 1/3 the height of the body, and nearly as high as the commencement of the soft dorsal, the last ray of which is rather prolonged. Pectoral falciform and 1 diameter of the eye longer than the head: ventral reaches half way to the anal, the spine of which fin is well developed, and nearly half as long as the first ray: the base of the last ray is rather distant from the one preceding it. Caudal deeply forked. *Scales*—over body, chest, cheeks, but not on the upper jaw, or occipital crest which is moderately developed. *Lateral-line*—with a long irregular curve (which is 3/4 as long as the straight portion) becoming straight below the sixth or seventh dorsal ray: the plates begin about the fifth or eighth scale on the straight portion, becoming well developed near the end of the dorsal fin, below which they equal 1/7 of the height of the body. About 100 rows of scales along the lateral-line, and 125 rows descend from the back to it along its whole course. Free portion of tail rather longer than high. *Colours*—silvery along the back, becoming golden on the abdomen, a series of short vertical bands, as wide as the ground colour, cross the lateral-line along its whole extent. A black shoulder spot extending on to the opercle. Fins yellow, tip of second dorsal anteriorly white, posteriorly with rather a dark summit: anal with a white edge.

This species is figured amongst Sir W. Elliot's Fishes of Madras, as *Warri parah*, Tam.

Habitat.—Red Sea, seas of India, Andamans, to the Malay Archipelago and beyond. The specimen figured, nearly 8 inches long, is from Madras, where it is common, especially during the cold months. I have found some full of developed ova as early as March.

14. Caranx kalla, Plate XLIX, fig. 5.

Cuv. and Val. ix, p. 49; Day, Fish. Malabar, p. 83.

Selar brevis, Bleeker, Makr. p. 54.

Selar kalla, Bleeker, Beng. en Hind. p. 44.

* In a young specimen, $3\frac{3}{4}$ inches long, crenulations are visible on the angle and lower limb of the preopercle.

Caranx calla, Günther, Catal. ii, p. 433.
Caranx brevis, Günther, Catal. ii, p. 435.
Kalla parah, Tam.

B. vii, D. 8 | $\frac{1}{23-24}$, P. 20, V. 1/5, A. 2 | $\frac{1}{19-20}$, C. 17, L. l. 40-44.

Length of head $4\frac{1}{2}$ to 1/5, of caudal $4\frac{2}{3}$, height of body from 1/3 to $3\frac{1}{2}$ of the total length. *Eye*—with a developed posterior adipose lid, diameter 1/3 of length of head, 2/3 of a diameter from end of snout, and 3/4 of a diameter apart. The abdominal profile more convex than that of the back. The greatest width of the head is 4/7 of its length, its height nearly equals its length. Lower jaw the longer: the maxilla reaches to below the first third of the eye. Greatest depth of preorbital equal to half the diameter of the eye. *Teeth*—in the jaws in a single row, in a ʌ-shaped spot on the vomer, in a band on the palatines, also along the middle of the tongue. *Fins*—dorsal spines of moderate strength, the third and fourth the longest and equal to 1/3 the height of the body, and 1/4 less than the anterior portion of the second dorsal fin. Pectoral falciform, from 4/5 to as long as the body is high: ventral short, not reaching half way to the anal. Anal commences below the fourth dorsal ray, its last ray as well as that of the dorsal a little elongated. Caudal deeply forked, upper lobe the longer. *Scales*—over the body, chest, and some on the cheeks: a well developed sheath to dorsal and anal fins. *Lateral-line*—having 80 scales, rather strongly curved anteriorly, but not ending abruptly, the height of its arch equals 1/3 of its length, whilst its length equals $1\frac{2}{3}$ in that of the straight portion, which last commences below the fourth or fifth dorsal ray. Its keeled plates begin at the commencement of the straight portion, and below the end of the second dorsal they equal 1/7 of the height of the body. The free portion of the tail longer than high. *Colours*—bluish-green above, shot with silver, sides and abdomen silvery, with nacreous reflections: a distinct black spot on the opercle. The tail and the caudal fin brilliant yellow, the upper lobe being tinged with green: the other fins white, excepting the dorsal which has some black upon it.

Caranx para, Cuv. and Val. ix, p. 58, and *? C. cambou*, C.V. ix, p. 60; *Selar para*, Bleeker, Makr. p. 56, may be this species.

Habitat.—Red Sea, seas of India and China, attaining at least 8 inches in length. The specimen figured ($5\frac{1}{2}$ inches long) is from Madras.

15. Caranx ire, Plate XLIX, fig. 6.

Cuv. and Val. ix, p. 57; Günther, Catal. ii, p. 436.

Caranx præustus, Bennett, Life of Raffles, p. 689; Günther, Catal. ii, p. 436; Peters, Monats. Ak. Berlin, 1868, p. 262.

Carangoides præustus, Bleeker, Makr. p. 364, and Verh. Bat. Gen. xxiv, Makr. p. 60, and Bintang, 1868, p. 5.

Selar ire, Bleeker, Beng. en Hind. p. 44.
Citula præusta, Bleeker, Bintang, 1868, p. 5.
Caranx melanostethos, Day, Proc. Zool. Soc. 1865, p. 23, and Fish. Malabar, p. 83, pl. vi.
Ire-parah, Tam.; *Oolim-parah*, Mal.

B. vii, D. 8 | $\frac{1}{23-24}$, P. 20, V. 1/5, A. 2 | $\frac{1}{19-20}$, C. 19, L. l. 26-28.

Length of head $4\frac{1}{2}$ to $4\frac{2}{3}$, of pectoral 1/5, of caudal 2/9, height of body $3\frac{2}{3}$ to 1/4 of the total length. *Eye*—having a narrow posterior adipose lid extending not quite half way to the pupil,* diameter of eye $3\frac{1}{2}$ to 1/4 in length of head, from 1 to $1\frac{1}{3}$ diameter from end of snout, and nearly 4/5 of a diameter apart. Dorsal and anal profiles about equally convex: snout slightly elevated. Greatest width of head equals nearly half its length, whilst its height is about the same as its length. Jaws of about equal length anteriorly, or the lower slightly the longer: the maxilla reaches to below the front edge or first third of the eye. Preorbital in its deepest part equals rather more than 1/2 a diameter of the orbit. *Teeth*—in villiform bands in both jaws, which become a single row laterally in the lower: the outer row in the upper jaw being a little enlarged. In a semilunar spot anteriorly on the vomer, whilst posteriorly there exists a long narrow band along the median line: in a band on the palatines and also along the middle of the tongue. *Fins*—spines of first dorsal weak, the third slightly the longest and equal to about 1/3 of the height of the body. Second dorsal highest anteriorly where its rays equal from 1/2 to $2\frac{1}{3}$ in the height of the body. Pectoral reaches to above the commencement of the anal fin, which last is similar to the soft dorsal. Caudal deeply forked, upper lobe usually the longer. *Scales*—cover the body except just in front of the ventral fins: superiorly they extend forwards on the head to above the eyes, cheeks, and upper portion of the opercle, but there are none on the snout, preorbital, nor occipital crest: the soft dorsal and anal fins have a high scaly sheath. *Lateral-line*—consists of about 102 scales, at first it is moderately curved, becoming straight below the eighth dorsal ray, but the keeled scales do not commence until underneath the fifteenth ray, they are well developed but not very strong, the highest equalling about 1/10 of that of the body. Free portion of the tail rather longer than high. *Colours*—gray along the back, becoming lighter on the abdomen, the whole glossed with purple and gold. Head and chest are occasionally brownish-black. No opercular spot. Fins yellow, with black points, the anterior portion of the second dorsal black with a white tip, the rest of the fin and of the anal more or less dark. Caudal sometimes with black tips and a white edge.

This species is named *Nune parah* and *Karamunji parah*, Tam., in Sir W. Elliot's collection.

* This varies with age, also in individual specimens, in one at 3 inches in length it reaches the pupil.

Habitat.—Seas of India to the Malay Archipelago. Grows to upwards of a foot in length. In Malabar it is mostly captured during the cold months.

16. Caranx compressus, Plate L, fig. 1.

Caranx ferdau, Rüppell, Atl. Fische, p. 99, t. xxv, f. 6; Cuv. and Val. ix, p. 56; Günther, Catal. ii, p. 439 (not Forsk.).
Caranx compressus, Day, Proc. Zool. Soc. 1870, p. 689.
Caranx brevicarinatus, Klunz. Verh. z. b. Ges. Wien, 1871, p. 461.

B. vii, D. 8 | $\frac{1}{22-24}$, P. 21, V. 1/5, A. 2 | $\frac{1}{19-20}$, C. 21, L. l. 13.

Length of head 1/4 to $4\frac{1}{4}$, of caudal 1/5, height of body $3\frac{1}{4}$ to $3\frac{1}{2}$ in the total length. *Eyes*—without adipose lids, situated just above the centre of the height of the head and 1 vertical diameter from the upper profile, diameter of eyes $3\frac{1}{2}$ to 1/4 of length of head, $1\frac{1}{3}$ to $1\frac{2}{3}$ diameters from end of snout, and 1 apart. Body rather strongly compressed, dorsal and abdominal profiles equally convex: occipital crest well developed. Greatest width of head equals 1/5, and its height the entire length of the head. Lower jaw the longer: cleft of mouth commences opposite the middle or upper third of the eye, and the maxilla reaches to below the front edge or first third of the orbit. Greatest depth of preorbital equals 2/3 to 3/4 of the diameter of the eye. *Teeth*—villiform in both jaws, becoming in a single narrow band laterally in the lower, also present on the vomer, palate, and tongue. *Fins*—third dorsal spine longest, and equal to 1/3 or 2/7 of the height of the body, and only 2/3 as high as the anterior portion of second dorsal fin. Pectoral falciform and 1/4 longer than the head. Ventral reaches 1/2 way to the anal. Anal similar to but lower than the second dorsal. Caudal forked. *Scales*—present on the cheeks, round the posterior edge of the eye, the body and chest, also forming a low groove along the bases of second dorsal and anal fins. *Lateral-line*—containing about 150 scales, it forms a very gradual curve to below the 12th dorsal ray when it becomes straight, the keels are most developed on the free portion of the tail, where the largest equal 1/28 of the height of the body. Free portion of the tail 1/2 longer than high at its base. *Colours*—silvery, with a minute opercular spot: vertical margin of preopercle dark.

Habitat.—Red Sea and Andamans, where the specimen (16 inches long) which is figured was captured.

17. Caranx atropus.

Brama atropus, Bl. Schn. p. 98, t. 23.
Scomber mais-parah, Russell, Fish. Vizag. ii, p. 38, pl. 152.
Caranx nigripes, Cuv. and Val. ix, p. 122; Richards. Ich. China, p. 275, Cantor, Catal. p. 129; Jerdon, M. J. L. and Sc. 1851, p. 137; Kner, Novara Fische, p. 159.
Olistus atropus, Cuv. and Val. ix, p. 141.
Carangoides atropus, Bleeker, Makr. p. 66.
Caranx atropus, Cantor, Catal. p. 130; Günther, Catal. ii, p. 450; Day, Fish. Malabar, p. 88.
Kunni parah, Tam.

B. vii, D. 8 | $\frac{1}{22}$, P. 22, V. 1/5, A. 2 | $\frac{1}{18}$, C. 16, L. l. 32-35, Vert. 10/14.

Length of head 1/4 to 2/7, of pectoral 2/7, of caudal 1/4 to 2/7, height of body 2/5 of the total length. *Eyes*—without adipose lids, diameter 3/10 to 2/7 of length of head, 2/3 of a diameter from end of snout, and also apart. Body oval, strongly compressed, with the crest on the summit of the head well developed. Greatest width of the head equals rather more than half its length, and its height 1/5 more than its length. Cleft of mouth commences anteriorly opposite the centre of the front edge of the eye, and the maxilla reaches to below the middle of the orbit: lower jaw the longer. The greatest depth of the preorbital equals about 1/2 the diameter of the eye. *Teeth*—in two rows in both jaws, the outer in the premaxillaries very slightly the larger: in the lower jaw the teeth laterally form only a single row: in a triangular patch on the vomer, in a narrow band on the palatines, and also along the middle of the tongue. *Fins*—spines of first dorsal weak, the third and fourth the longest, and equal to 1/5 of the height of the body: second dorsal highest anteriorly, its second ray being equal to 1/3 of the height of the body. Pectoral falciform. Ventral with a weak spine and elongated rays which reach as far as the anal fin, and are receivable into a groove, at the bottom of which are inserted the two pre-anal spines. Caudal deeply lobed. *Scales*—a few on the cheeks and below the eye, none on the remainder of the head; body scaled except on the chest and from between the bases of the pectoral and ventral fins to the head. They form a rather high scaly sheath to the second dorsal and anal fins. *Lateral-line*—consists of about 75 rows, it curves to below the fifth ray of the dorsal fin, subsequent to which the keeled scales commence, the widest below the last fourth of the dorsal fin being equal to 1/17 of the height of the body. *Colours*—bluish-green along the back, becoming silvery shot with purple on the sides and beneath: a well marked black opercular spot: ventrals deep black. The *young* are vertically banded, and the opercular spot indistinct or absent.

In a specimen $3\frac{1}{5}$ inches in length the angle and lower edge of the preopercle are crenulated.

Habitat.—Seas of India to the Malay Archipelago, attaining at least a foot in length.

18. Caranx Malabaricus, Plate L, fig. 2.

Scomber Malabaricus, Bl. Schn. p. 31.
Scomber talam parah, Russell, ii, p. 37, pl. 150.

Caranx cæruleo-pinnatus, Rüpp. Atl. Fische, p. 100, and N. W. Fische, p. 47, t. xiii, fig. 2 (not Cuv. and Val.).

Caranx Malabaricus, Cuv. and Val. ix, p. 121; Richards. Ich. China. p. 275; Cantor, Catal. p. 128; Jerdon, M. J. L. and Sc. 1851, p. 137; Günther, Catal. ii, p. 437; Kner, Novara Fische, p. 155; Klunz. Verh. z. b. Ges. Wien, 1871, p. 463.

Carangoides telamparah, Bleeker, Makr. p. 64.

Carangoides Malabaricus, Bleeker, en Pisc. p. 69.

Citula Malabarica, Bleeker, Madagas. p. 99.

B. vii, D. 7-8 | $\frac{1}{21-22}$, P. 21, V. 1/5, A. 2 | $\frac{1}{17-18}$, C. 21, L. l. 28.

Length of head $3\frac{3}{4}$ to 1/4, of caudal $4\frac{1}{2}$ to $4\frac{2}{3}$, height of body $2\frac{1}{2}$ in the young to $2\frac{2}{3}$ in the adult of the total length. *Eyes*—without distinct adipose lids, but the skin rather projects over the eye; diameter of eyes 1/3 of length of head, 1 diameter from end of snout, and 3/4 of a diameter apart. Body oval and strongly compressed, dorsal and anal profiles equally convex, a slight concavity, most distinct in the adult, opposite the middle of the eyes: the occipital crest well developed. Greatest width of the head equals nearly 1/2 its length: the height of the head is a little more than its length. Cleft of the mouth commences opposite the lower edge of the orbit: the lower jaw slightly the longer: the maxilla reaches to below the first third of the eye. Greatest depth of the preorbital nearly equals 1 diameter of the orbit. *Teeth*—villiform in both jaws, in a somewhat triangular spot on the vomer, an elongated band along the palatines, and likewise along the centre of the tongue being widest anteriorly. *Fins*—dorsal spines of moderate strength, the second, third, and fourth being of about the same height, and equal to 2/5 of that of the body: second dorsal highest anteriorly, where the rays equal $2\frac{2}{3}$ in that of the body and are similar to those in the anal. Pectoral rather longer than the head. Ventral small, reaching 2/3 of the way to the pre-anal spines. Caudal deeply forked. *Scales*—on the head there are merely a few behind the middle of the eye, none on the chest. Only a low groove along the first part of the soft dorsal fin. *Lateral-line*—having about 90 to 105 scales, it forms a low curve to below the twelfth or thirteenth dorsal ray. Its plates only commence under about the twentieth ray, becoming most developed on the side of the free portion of the tail, when their greatest depth only equals 1/20 to 1/30 of the height of the body, being proportionately smaller in the adults. Free portion of the tail 1/2 longer than high at its base. *Colours*—back bluish, sides and abdomen silvery shot with purple: a dull black mark in axilla. The whole of the posterior half and upper edge of the opercle stained black or brown (said to be sometimes absent). Dorsal usually stained darkest at its outer edge, the other fins pale yellow.

Jerdon observes that this fish is termed *Tollum parah*, Tam.

I have two young *Caranx's*, $1\frac{3}{5}$ and $2\frac{4}{5}$ inches long, which appear to be the young of this species, the height of the body of the smallest is $1\frac{3}{4}$ in the total length, its ventrals reach the anal fin: it is vertically banded, the first dorsal and ventral black. In the larger specimen the height of the body is $2\frac{1}{4}$ in the total length, the ventrals reach the pre-anal spines, whilst the vertical bands have begun to disappear. The first dorsal and ventral are black.

Habitat.—Red Sea, seas of India to the Malay Archipelago and beyond, attaining at least a foot in length, the specimen figured is from Madras, it is nearly 8 inches long.

19. Caranx oblongus, Plate LI, fig. 1.

Cuv. and Val. ix, p. 128; Cantor, Catal. p. 132; Günther, Catal. ii, p. 452.

Carangoides oblongus, Bleeker, Makr. p. 62.

Ro-thul-dah, Andam.

B. vii, D. 8 | $\frac{1}{21-22}$, P. 21, V. 1/5, A. 2 | $\frac{1}{18-19}$, C. 18, L. l. 34-40.

Length of head 1/4 to 2/9, of caudal $4\frac{1}{4}$, height of body $3\frac{1}{4}$ in the total length. *Eyes*—without distinct adipose lids, diameter $3\frac{1}{4}$ in the young to $4\frac{1}{3}$ in the adult in length of head, nearly 1 diameter from end of snout, and 3/4 to 1 diameter apart. Body oval, with the dorsal profile rather more convex than that of the abdomen, a slight concavity in the profile opposite the upper third of the eye. Greatest width of head 4/7 of its length, its height rather more than its length. Occipital crest moderately developed. Upper edge of eye rather close to the dorsal profile. Lower jaw the longer. Cleft of mouth oblique, commencing opposite the upper third or centre of the front edge of the orbit, the maxilla reaching to below the middle of the eye. Greatest width of preorbital equals 1/2 in the young to 3/4 in the adult of the diameter of the orbit. Preopercle with some rather strong denticulations along both limbs, which become almost imperceptible in the adult. *Teeth*—in a narrow villiform band, or in two rows in the premaxillaries, having the outer slightly enlarged: in a single row in the lower jaw, except at its anterior portion where they are the largest, and have a few villiform ones posteriorly. In a triangular spot on the vomer, and in a band along the palatines, and on the tongue. *Fins*—dorsal spines low, the longest equal to $3\frac{1}{3}$ or 1/4 in the height of the body: second dorsal very much elevated anteriorly, where its rays equal from 3/4 to the height of the body. Pectoral as long or longer than the head. Ventral almost reaches the pre-anal spines. Anterior rays of anal elongated and equal to 3/5 of the height of the body. Caudal deeply forked. *Scales*—along the upper and hind edge of the eyes, on the cheeks and body, except on the chest as high as the pectoral fin, which is scaleless in the young, but in the adult this scaleless portion is confined to the chest anterior to the ventral fin, and about half the distance to the base of the pectoral. A low sheath to second dorsal and anal fins. *Lateral-line*—in about 105 rows, at first in the form of plate-like rounded scales it goes directly backwards and commences to descend

below the commencement of the second dorsal, becoming straight beneath its ninth ray; the height of the arch equals 2/9 of its length: the keeled scales extend along the whole of its keeled portion, the widest equalling about 1/13 of the height of the body. Free portion of the tail as high at its commencement as it is long. *Colours*—golden in the young, with vertical bluish bands, which soon fade after death: the adults are more olive, becoming dull white beneath. No opercular spot. Fins yellow, stained at their edges, due to innumerable fine dots: caudal orange, with its last half black, having a light tip to either lobe.

Habitat.—Seas of India to the Malay Archipelago and beyond. Largest specimen from Madras, 5 inches long. Cantor's type is $4\frac{1}{4}$ inches in length, and these two specimens with their serrated preopercles approach very closely to *Carangichthys typus*, Bleeker, which has D. 8 | $\frac{1}{18}$, A. 2 | $\frac{1}{17}$, L. l. 22. The one figured (8 inches long) is from the Andaman islands.

20. **Caranx nigrescens**, Plate L, fig. 6.

Day, Proc. Zool. Soc. 1867, p. 704.
Tanga parah, Tam.

B. vii, D. 8 | $\frac{1}{19}$, P. 19, V. 1/5, A. 2 | $\frac{1}{17}$, C. 19, L. l. 23.

Length of head nearly 1/4, of caudal 2/9, height of body 2/7 of the total length. *Eyes*—without any adipose lids, diameter 1/5 of length of head, nearly 2 diameters from end of snout, and $1\frac{1}{4}$ apart. Dorsal profile slightly more convex than that of the abdomen, interorbital crest well developed. Greatest width of head equals half of its length, and its height equals its length. Lower jaw very slightly the longer, cleft of mouth commences anteriorly below the level of the eye, it is very slightly oblique, the maxilla reaches to below the front edge of the eye. Lower limb of preopercle, also sub- and interopercles crenulated. *Teeth*—in numerous villiform rows in both jaws, a triangular patch on the vomer, in a long narrow band on the palatines, none on the tongue. *Fins*—third dorsal spine the longest, equal to 2/7 of the height of the body and rather above 1/2 as high as the anterior dorsal rays, which fin is elevated in its first part. Pectoral falciform, a little longer than the head and reaching to below the middle of the soft dorsal fin. Anal similar in form, but a little lower than the second dorsal. Caudal deeply forked. *Scales*—on cheeks round the eyes, upper portion of opercle and body, none on the chest as high as the base of the pectoral fin. *Lateral-line*—contains 140 scales, at first it forms a very low long curve to below the thirteenth dorsal ray, from whence it gradually becomes straight, the length of the base of the arch equalling that of the straight portion of the fin. Keeled scales are but slightly developed, being only distinct in the last 8 scales where the largest equals 1/20 of the height of the body. Free portion of the tail at its base nearly equals its length. *Colours*—of a dusky-grayish, having innumerable fine black points, and generally glossed with purple. A well marked black opercular spot. Fins nearly black, especially the dorsal.

This species appears to be allied to *C. chrysophrys*, Cuv. and Val. which has D. 8 | $\frac{1}{19}$, A. 2 | $\frac{1}{16}$, but the figure shows a much higher body ($2\frac{2}{3}$ of the total length) and the eye placed more in the centre of the depth of the head. No opercular spot.

Habitat.—Madras, where the specimen figured (a male, 24 inches long) was captured in March, 1867. The fishermen asserted that it annually arrived from the deep sea about March.

21. **Caranx armatus**, Plate LI, fig. 2.

Sciæna armata, Forsk. p. 53; Gmel. Linn. p. 1306.
Scomber, Russell, ii, p. 38, and *Tchawil parah*, pl. 151 *(young)*.
Citula plumbea, Quoy and Gaim. Voy. Freyc. Zool. Poiss. p. 361.
Citula ciliaria, Rüpp. Atl. Fische, p. 102, t. xxv, f. 8; Kner, Novara Fische, p. 156.
Citula armata, Rüpp. Atl. Fische, p. 103, and N. W. Fische, p. 50; Bleeker, Madagas. p. 99.
Caranx citula et *cirrhosus* (Ehren.) Cuv. and Val. ix, p. 126, pl. 250.
Caranx armatus, Cuv. and Val. ix, p. 127; Cantor, Catal. p. 131; Günther, Catal. ii, p. 453; Day, Fishes of Malabar, p. 89; Klunz. Verh. z. b. Ges. Wien, 1871, p. 455.
Caranx ciliaris, Cuv. and Val. ix, p. 129 *(young)*; Temm. and Schleg. Fauna Japon. Poiss. p. 112; Richards. Ich. China, p. 276; Jerdon, M. J. L. and Sc. 1851, p. 137.
Olistus Malabaricus, Cuv. and Val. ix, p. 137, pl. 251; Cuv. Règ. Anim. Ill. Poiss. pl. 58, f. 1.
Olistus Ruppellii, Cuv. and Val. ix, p. 144.
Carangoides citula, Bleeker, Makr. p. 65.
Carangoides armatus, Bleeker, en Pisc. p. 67.
Tanga parah, Tam.

B. vii, D. 6-8 | $\frac{1}{20-21}$, P. 21, V. 1/5, A. 2 | $\frac{1}{16-17}$, C. 19, L. l. 20.

Length of head 2/9 to 1/5, of pectoral 2/7, height of body 2/5 to 4/11 of the total length. *Eye*—with a very narrow posterior adipose lid, diameter $3\frac{1}{4}$ to $3\frac{1}{2}$ in the length of head, 3/4 to 1 diameter from end of snout, and also apart. Body oval, the dorsal and anal profiles about equally convex. Greatest width of the head equals 3/5 of its length, its height 1/4 more than its length. Lower jaw the longer, cleft of mouth commences opposite the middle of the eyes: the maxilla reaches posteriorly to below the anterior 1/3 or centre of the eye. Greatest depth of the preorbital equals 2/3 of the diameter of the orbit. *Teeth*—villiform in both jaws, with an outer somewhat enlarged row in the premaxillaries: they are also present in a triangular spot on the vomer, and in an elongated band along the palatines and middle of the tongue. *Fins*—second to fourth dorsal

spines sub-equal in length and about 2/9 of the height of the body: second dorsal much elongated anteriorly, the first few rays occasionally reaching the caudal fin: in some specimens all the rays have prolongations, usually only the first few. Pectoral falciform, extending to at least below the middle of the soft dorsal. Ventral reaches rather above half way to the anal. Caudal deeply forked. *Scales*—a few on the hind portion of the head, round the eyes and on the cheeks, also over the body except the chest and the portion anterior to the bases of the pectoral and ventral fins. They also form a groove for the soft dorsal and anal fins. *Lateral-line*—consists of 104 scales, it makes a long low curve becoming straight beneath the middle of the second dorsal, the keeled plates are developed in the last half of the horizontal portion of the lateral-line, but are not large. Free portion of the tail hardly so high at its base as it is long. *Colours*—upper surface of head and back bluish-green, sides of the head and body golden, with purple reflections. Opercular spot moderately distinct. First dorsal blackish, second and anal yellowish, with darker edges. Pectoral dark behind its base. The *young* vertically banded.

Habitat.—Red Sea, East coast of Africa, seas of India to the Malay Archipelago and beyond, attaining at least 20 inches in length. The specimen figured (8 inches long) is from the Andamans.

22. Caranx gallus, Plate LI, fig. 3.

Zeus gallus, Linn. Sys. i, p. 454; Bloch, t. 192, and Gmel. Linn. p. 1222; Bl. Schn. p. 94; Russell, Fish. Vizag. i, p. 45, and *Gurrah parah*, pl. 57.

Zeus vomer, Russell, l. c. p. 46, and *Cheewoola parah*, pl. 58 (not *Zeus vomer*, Linn.).

Gallus virescens, Lacép. iv, pp. 583, 584.

Gallichthys major, Cuv. and Val. ix, p. 168, pl. 254; Cantor, Catal. p. 136; Richards. Ich. China, p. 271.

Gallichthys chevola, Cuv. and Val. ix, p. 175.

Scyris Indica, Rüpp. Atl. Fische, p. 128, t. 33, f. 1 *(young)*; Cuv. and Val. ix, p. 145, pl. 252 *(adult ?)*; Rüpp. N. W. Fische, p. 51; Swainson, Fishes, ii, p. 251; Richards. Ich. China, p. 276; Cantor, Catal. p. 134.

Blepharis gallichthys, Swainson, Fishes, ii, p. 250.

Scyris Ruppellii, Swainson, *l. c.* p. 251.

Carangoides gallichthys, Bleeker, Makr. p. 68.

Caranx gallus, Günther, Catal. ii, p. 455; Day, Fish. Malabar, p. 91; Klunz. Verh. z. b. Ges. Wien, 1871, p. 454.

Citula gallus, Bleeker, Bintang, 1868, p. 5.

B. vii, D. 0-6 | $\frac{1}{19}$, P. 17, V. 1/5, A. 0-2 | $\frac{1}{16}$, C. 19, L. l. 8-10, Vert. 10/14.

Length of head from $3\frac{1}{3}$ at 6 inches to $4\frac{2}{3}$ at 23 inches in the total length: of caudal $3\frac{1}{2}$ to $4\frac{1}{2}$, height of body $1\frac{3}{4}$ to 1/3 of the total length. *Eye*—without or with only a small posterior adipose lid, diameter $3\frac{1}{3}$ to 1/4 in length of head, $1\frac{1}{2}$ to $1\frac{3}{4}$ diameters from end of snout. Body much elevated, especially in the young, and strongly compressed: central longitudinal crest on the head much raised, causing the dorsal profile before the eyes to be concave. Lower jaw the longer, cleft of mouth commences below the level of the eye, the maxilla reaches to nearly below the ventral from the front edge of the orbit. Preorbital very high, equalling from $1\frac{1}{3}$ to $1\frac{2}{3}$ diameters of the orbit. *Teeth*—apparently villiform in the young in jaws, vomer, palatines, and tongue, but in adults (as at 23 inches long) it is seen that they assume an entirely different (or *Sparoid*) character, having rounded crowns, 5 rows in the premaxillaries, and 4 in the lower jaw, decreasing to 2 or 1 posteriorly: whilst the vomer has only a single row across it. *Fins*—the spinous first dorsal in the young appears in a rudimentary form, becoming absorbed as age advances: the second dorsal commences at the most elevated point of the back, its rays, especially the first 7 or 8, are elongated and have filiform terminations. Pectoral rather longer than the head. Ventral with its two outer rays elongated in the young, not so in the adult. The pre-anal spines are apparent in the immature. First two or three anal rays elongated, but not so much so as those of the dorsal fin. Caudal deeply forked. *Scales*—rudimentary or absent except along the lateral-line: at the free portion of the tail they are keeled, anteriorly they are small and rounded. A low keel on either side of base of the tail in adults. *Lateral-line*—first ascends, then curves to below the 12th dorsal ray when it becomes straight. *Pyloric appendages*—numerous. *Colours*—silvery glossed with purple and gold: the young with five wide vertical bands which disappear with age. A small, dark opercular spot in the adult. Filamentous prolongations of fins dark or black.

Habitat.—Red Sea, through those of India to the Malay Archipelago and beyond, attaining at least 2 feet in length (said to reach 5 feet) and is not uncommon.

23. Caranx ciliaris.

Zeus ciliaris, Bloch, t. 191; Gmel. Linn. p. 1223; Bl. Schn. p. 94; Shaw, Zool. iv, p. 283; Lacép. iv, pp. 570, 572.

Scomber filamentosus, Mungo Park, Trans. Linn. Soc. iii, p. 36; Bl. Schn. p. 34.

Blepharis Indicus, Cuv. and Val. ix, p. 154; Tem. and Schleg. Fauna, Japon. Poiss. p. 113, pl. 60, f. 2; Cuv. Règ. Anim. Ill. Poissons, pl. 58, f. 3; Richards. Ich. China, p. 271.

Blepharis fasciatus, Rüpp. Atl. Fische, p. 129, t. 33, f. 2.

Carangoides blepharis, Bleeker, Makr. p. 67.

Caranx ciliaris, Günther, Catal. ii, p. 454; Day, Fish. Malabar, p. 90; Klunz. Verh. z. b. Ges. Wien, 1871, p. 454.

B. vii, D. 6 | $\frac{1}{19}$, P. 18, V. 1/5, A. 2 | $\frac{1}{16}$, C. 19, L. l. 15.

Length of head $3\frac{1}{2}$ to $3\frac{2}{3}$, of caudal 2/9, height of body $1\frac{1}{2}$ to $1\frac{3}{4}$ in the total length. *Eyes*—without adipose lids, diameter 1/3 of length of head, 3/4 to 1 diameter from end of snout. Body elevated and compressed, a swelling in the dorsal profile opposite the eyes, causing a slight concavity below and also above them. Lower jaw the longer, cleft of mouth commences just below, or level with, the lower edge of the orbit: the maxilla reaches to below the front edge or first third of the eyes. Greatest height of preorbital equalling from 3/4 to 1 diameter of the orbit. *Teeth*—villiform in jaws, vomer, palatines, and tongue. *Fins*—spinous first dorsal rudimentary: the second dorsal commencing at the most elevated point of the back, has its first five or six rays elongated and with filiform terminations. Pectoral as long as the head. Ventral reaches the anal. Anterior rays of anal elongated similarly to the second dorsal. Caudal deeply forked. *Scales*—absent except on the lateral-line. *Lateral-line*—with a strong bend anteriorly, becoming straight below the ninth or tenth dorsal ray. *Colours*—silvery, with five or six vertical bands on the body. Anterior portion of soft dorsal and anal black. An opercular spot.

Habitat.—From the Red Sea, through those of India to the Malay Archipelago and beyond. This species is not nearly so common as *C. gallus*.

B. No teeth on the palate.

24. **Caranx leptolepis**, Plate LI, fig. 4.

Caranx leptolepis et *Mertensii*, Cuv. and Val. ix, pp. 63, 64.
Caranx leptolepis, Cantor, Catal. p. 127; Günther, Catal. ii, p. 440.
Letaspis leptolepis, Bleeker, Makr. p. 71.
Selaroides leptolepis, Bleeker, l. c. p. 87.
Caranx Bidii, Day, Proc. Zool. Soc. 1873, p. 237.
Ramah parah, Tam.

B. vii, D. 8 | $\frac{1}{24-26}$, P. 20, V. 1/5, A. 2 | $\frac{1}{21}$, C. 17, L. l. 24-28.

Length of head $4\frac{1}{4}$ to $4\frac{1}{2}$, of caudal 1/5 to 2/11, height of body $3\frac{2}{3}$ to $4\frac{1}{4}$ in the total length. *Eye*—with a broad posterior adipose lid which covers the hind third of the pupil, an anterior eyelid extends half the distance across the iris: diameter 2/7 of length of head, 1 to $1\frac{1}{4}$ diameters from the end of snout, and also apart. The greatest width of the head equals half its length, its height nearly equals its length: jaws of about the same length, or lower slightly the longer: the maxilla reaches to below the anterior edge of first third of the orbit. Preorbital in its deepest part equals 2/3 of the diameter of the orbit.* *Teeth*—fine ones in the anterior portion of the lower jaw, none on the upper, the vomer, or palate: a fine band on the tongue. *Fins*—dorsal spines weak, the third and fourth the longest and equal to 1/2 the height of the body: anterior portion of soft dorsal the highest and equal to $2\frac{1}{3}$ in that of the body. Pectoral rather longer than the head and reaching to above the fourth anal ray: ventral nearly reaches to the pre-anal spines. Last dorsal and anal ray somewhat elongated. Caudal forked. *Scales*—over body, chest, cheeks, and superiorly on the head to above the middle of the eye. *Lateral-line*—ninety-five scales, it makes a very gentle curve, becoming straight from below the first third of the second dorsal fin: keeled scales begin so gradually under the last portion of the second dorsal that it is difficult to decide where they commence, the longest are below the commencement of the free portion of the tail, and equal about $\frac{1}{14}$ of the height of the body. Free portion of the tail one-fourth higher at its base than it is long. *Colours*—silvery, a broad golden stripe from above the eye to the upper edge of the tail, lower two-third of dorsal fin yellow, upper third dark. Anal having its outer third white, the rest yellow: a large deep black spot on the shoulder, said to be sometimes absent *(C. Mertensii)*.

This species is termed *Nama parah*, Tam., in Sir Walter Elliot's figures of Madras Fishes.

Habitat.—Seas of India to the Malay Archipelago. The specimen figured ($6\frac{3}{4}$ inches in length) is from Madras.

25. **Caranx nigripinnis**, Plate LI, fig. 5.

? Scomber wori-parah,† Russell, ii, p. 40, pl. 155.

B. vii, D. 7-8 | $\frac{1}{23-25}$, P. 23, V. 1/5, A. 2 | $\frac{1}{20-21}$, C. 19, L. l. 55-60.

Length of head $4\frac{1}{2}$ to $4\frac{2}{3}$, of caudal 4 to $4\frac{2}{3}$, height of body $3\frac{1}{2}$ in the total length. *Eye*—with a wide anterior and posterior adipose lid; in one specimen with only a very broad posterior one reaching to across a portion of the pupil: diameter of eyes $3\frac{1}{2}$ to $3\frac{3}{4}$ in the length of head, 1 diameter from end of snout, and $1\frac{1}{3}$ apart. Dorsal and abdominal profiles about equally convex. Greatest width of head equals 4/7 of its length, and its height slightly less than its entire length. Snout and lower jaw rather broad and rounded, the width of the gape being rather more than the depth of the cleft, lower jaw somewhat the longer, the cleft of the mouth commences opposite the middle of the eye, the maxilla reaching to below the front edge of the eye. Greatest depth of preorbital equals 2/3 of the diameter of the orbit. *Teeth*—in both jaws in a single row of equal size, none on the vomer or palate, some on the tongue. *Fins*—dorsal spines of moderate strength, the third the longest, and equal to from 3/8 to 1/3 of the height of the body, and from 1/4 shorter to as long as

* In a specimen $3\frac{2}{3}$ inches long the lower edge of the preopercle is crenulated.

† Bleeker considers this species as *Carangoides* or *Caranx præustus*, Bennett=*C. ire*, C. V., but the curve of its lateral-line and its black first dorsal fin would make it more suitable to *C. nigripinnis*. Russell says it has no scales and that the skin is singularly striated. Swainson, Fishes, ii, p. 248, names Russell's figure *Alepes melanoptera*.

the first rays, last dorsal ray thickened but not prolonged. Pectoral falciform, and from as long as, to slightly longer than the head. Ventral reaches half-way to the anal. Caudal rather deeply forked. *Scales*—over body, chest, behind the eyes, and on the upper portion of the opercles. No sheath to the soft dorsal and anal fins. *Lateral-line*—consisting of 105 scales, anteriorly moderately bent and becoming straight below the fourth or fifth dorsal rays where the plates commence, they soon become pretty well developed, the depth of the largest equalling from 1/11 to 1/13 of that of the body. Free portion of the tail longer than high. *Colours*—silvery, shot with gold: first dorsal deep black, anal with a white edge. A wide dark band along the second dorsal, having its upper anterior corner white.

Selar or *Caranx malam*, Bleeker, Makr. p. 363, and Bintang, 1868, p. 5, should from its generic name have teeth on the vomer and palate. This species would be a *Hemicaranx*, Bleeker.

Habitat.—Madras and Andamans. The specimen figured is 9 inches long, and from the Andamans.

26. Caranx speciosus.

Scomber speciosus, Forsk. p. 54; Gmel. Linn. 1332; Shaw, Zool. iv, p. 603.

Caranx speciosus, Lacép. iii, p. 72, pl. i, fig. 1; Cuv. and Val. ix, p. 130; Cantor, Catal. p. 133: Jerdon, M. J. L. and Sc. 1851, p. 137; Peters, Wieg. Arch. 1855, p. 245; Günther, Catal. ii, p. 444; Day, Fishes of Malabar, p. 84; Klunz. Verh. z. b. Ges. Wien, 1871, p. 455.

Scomber, Russell, Fish. Vizag. ii. p. 36, and *Poloosoo parah*, pl. 149.

Caranx petaurista, Geoff. Desc. Eg. pl. 23, f. 1 (not Rüppell).

Zonichthys subcarinata, Swainson, Fishes, ii, p. 248.

Gnathanodon speciosus, Bleeker, Makr. p. 72.

Caranx poloosoo, Richards. Voy. Erebus and Terror, Ich. pl. 58, f. 4, 5.

B. vii, D. 7-8 | $\frac{1}{18-20}$, P. 22, V. 1/5, A. 2 | $\frac{1}{15-16}$, C. 19, L. l. 13-15.

Length of head $4\frac{1}{4}$, of caudal $4\frac{1}{2}$, height of body $3\frac{1}{4}$ in the total length. *Eyes*—in the centre of the depth of the head, without anterior or posterior adipose lids, but the skin extends slightly over the edge of the eye all round: diameter of eyes 1/4 to 2/9 of length of head, $1\frac{1}{2}$ diameters from end of snout. Body oval and strongly compressed. Interorbital space much elevated, having a crest along its centre. The greatest width of the head equals $2\frac{1}{4}$ in its length: whilst its height equals its length. Jaws of equal length anteriorly. The cleft of the mouth commences from opposite the lower edge of the eye, and the posterior extremity of the maxilla reaches to below the first third or centre of the orbit. Greatest depth of preorbital equals 1 diameter of eye. Pre- sub- and inter-opercles finely serrated in the young, crenulated or entire in the adult. *Teeth*—absent from jaws and palate. *Fins*—spines of first dorsal weak, the length of the third or the highest being equal to 1/4 of that of the body, interspinous membrane rather deeply emarginate: the recumbent spine anterior to the fin is very distinct in the young. Anterior portion of second dorsal the highest, decreasing to the ninth, from whence it remains the same height, the anterior rays equal $2\frac{1}{3}$ in the height of the body, upper edge of fin emarginate. Pectoral falcate longer than the head, and reaching to above the eleventh dorsal ray. The second of the anal free spines the longest. Anal fin commences on the vertical below the fifth dorsal ray and is of similar form to the second dorsal. Caudal deeply forked. *Scales*—small, some on cheeks, upper edge of opercle, and superiorly to above the hind third of the eye, none on the interorbital crest. Body and chest scaled. *Lateral-line*—about 106 rows along its whole course, the first portion of the lateral-line to below the sixth or eighth dorsal ray forms a long curve, from thence it proceeds direct to the centre of the tail, in the first portion of its straight course the plates are small, the last thirteen to fifteen are pretty well developed, and equal about 1/15 of the height of the body. *Colours*—golden, with vertical black bands alternately narrow and wide, going from the dorsal to the ventral surfaces. The first wide band descends obliquely through the eye, whilst on the body are five more wide bands, the first going over the shoulder touching the hind edge of the opercle, and the last over the free portion of the tail, between these wide ones are intermediate narrow ones. Dorsal fin minutely dotted with fine black points: upper edge of soft dorsal gray, end of caudal lobes black: anal golden. Adults are said to become of an uniform colour, a statement I have not been able to verify.

This species is termed *Pathi parah* and *Pilli parah*, Tam., in Sir W. Elliot's collection of drawings of fish.

Habitat.—From the Red Sea throughout the seas of India to the Malay Archipelago and beyond: it attains at least three feet in length, and at which size I have observed the colours to be still distinct.

Genus, 2—MICROPTERYX, *Agass.*

Seriola, sp. Cuv.: *Chloroscombrus*, Gir.: *Micropus*, Kner (not Gray).

Branchiostegals seven. Body compressed: abdomen prominent and trenchant. Gape of mouth rather small. Teeth feeble, present on vomer and palatines. Two dorsal fins, the first with 7 spines, and a recumbent, anteriorly-directed one in front of the base of the fin: the second and the anal considerably more developed and without finlets posteriorly: two pre-anal spines. Scales small. Lateral-line smooth. Air-vessel bifurcated posteriorly. Pyloric appendages in moderate numbers.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Micropteryx chrysurus*, D. 7 | $\frac{1}{26-27}$, A. 2 | $\frac{1}{25-26}$. Colour of body uniform, a dark square blotch on the back of the tail. Ventrals white. Pondicherry, West coast of Africa, Atlantic coasts of temperate and tropical America.

1. Micropteryx chrysurus.

Scomber chrysurus, Linn. Syst. i, p. 494; Bl. Schn. p. 33.
Scomber chloris, Bloch, t. 339; Bl. Schn. p. 27.
Micropteryx cosmopolita, Agass. in Spix, Pisc. Bras. p. 104, t. lix.
Seriola cosmopolita, Cuv. Règ. Anim.; Cuv. and Val. ix, p. 219, pl. 259; Dekay, New York, Fauna, Fishes, p. 129; Holbr. Ich. South Carolina, p. 77, pl. xi, f. 1; Guich. Poiss. in Sagra, Hist. Cuba, p. 117; Jerdon, M. J. L. and Sc. 1851, p. 137.
Scomber latus, Gronov. ed. Gray, p. 127.
Chloroscombrus cosmopolita, Girard, Proc. Acad. Nat. Sc. Phil. 1858, p. 168.
Chloroscombrus Caribæus, Girard, l. c.
Micropteryx chrysurus, Günther, Catal. ii, p. 460; Kner, Novara Fische, p. 161; Bleeker, Fish. New Guinea, p. 84.

B. vii, D. 7 | $\frac{1}{26-28}$, P. 18, V. 1/5, A. 2 | $\frac{1}{25-26}$, C. 17, Cæc. pyl. 10-15, Vert. 10/14.

Length of head $4\frac{3}{4}$ to $5\frac{1}{4}$, of caudal $4\frac{1}{2}$ to one-fifth, height of body $2\frac{2}{3}$ to one-third in the total length. *Eyes*—diameter $3\frac{1}{3}$ in the length of head, 1 diameter from end of snout, and 3/4 apart. Body high and very compressed: the abdominal more convex than the dorsal profile. Greatest width of the head equals 2/5 of its length; its height equals its length. Cleft of mouth almost vertical, it commences opposite the upper edge of the orbit, the lower jaw the longer and its end forming part of the dorsal profile when the mouth is closed: the maxilla reaches to below the first third of the eye. *Teeth*—fine ones on both jaws, vomer, palate, and tongue. *Fins*—dorsal spines weak, increasing in length to the third which is nearly as high as the anterior portion of the soft dorsal, and 1/5 of the height of the body. Pectoral falciform and $3\frac{1}{2}$ to $3\frac{3}{4}$ in the total length. Ventral short and equal to 1/5 the height of the body. Anal similar to second dorsal. Caudal forked. *Scales*—small, present behind the eyes and over the body, also forming a sheath for the bases of the dorsal and anal fins. *Lateral-line*—forms rather a strong curve in the first third of its course. *Colours*—greenish along the back, becoming silvery on the sides and beneath. A dark blotch over the free portion of the tail. Ventrals white.

Jerdon observed that this species is termed *Tergaree parah*, Tam. at Madras.

Habitat.—This fish frequents the West coast of Africa and the Atlantic coasts of America: it has also been captured at Pondicherry.

Genus, 3—Seriola, *Cuv.*

Branchiostegals seven: pseudobranchiæ. Body oblong and moderately compressed: abdomen rounded. Cleft of mouth sometimes deep. Preopercle entire. Villiform teeth in the jaws, vomer, and palatine bones. First dorsal fin continuous, its spines not strong, the second dorsal and anal with many more rays: as a rule a pair of pre-anal spines, remote from the rest of the fin. Scales small or rudimentary. Lateral-line unarmed. Air-vessel simple. Pyloric appendages many.

Geographical distribution.—Nearly all temperate and tropical seas.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Seriola nigrofasciata*, D. 5-6 | $\frac{1}{29-33}$, A. $\frac{1}{15-17}$. Five or six broad vertical bands on the body: a dark spot on either lobe of caudal. Red Sea, through the seas of India, to the Malay Archipelago and beyond.

1. Seriola nigrofasciata, Plate LI, fig. 6.

Nomeus nigrofasciatus, Rüpp. Atl. Fische, p. 92, t. xxiv, f. 2.
Seriola binotata ? Cuv. and Val. ix, p. 215; Cantor, Catal. p. 137.
Seriola Ruppellii, Cuv. and Val. ix, p. 216; Bleeker, Makr. p. 73.
Seriola nigrofasciata, Rüpp. N. W. Fische, p. 51; Günther, Catal. ii, p. 465; Klunz. Verh. z. b. Ges. Wien, 1871, p. 450.

B. vii, D. 5-6 | $\frac{1}{29-33}$, P. 19, V. 1/5, A. $\frac{1}{15-17}$, C. 19.

Length of head from $3\frac{2}{3}$ in the young to $4\frac{1}{2}$ in the adult, of caudal $5\frac{1}{2}$ to one-sixth, height of body $3\frac{1}{2}$ to one-fourth of the total length. *Eyes*—diameter 1/4 of length of head, 1 diameter from end of snout. Dorsal profile more convex than that of the abdomen; snout rather obtuse; abdomen broad. Lower jaw rather the longer. Cleft of mouth commences opposite the centre or lower third of the front edge of the eye, the maxilla reaches to below the middle or hind third of the eye. *Teeth*—villiform in jaws, vomer, palate, and on the tongue. *Fins*—first dorsal spines weak, low, from 1/3 to 1/2 the height of the second dorsal, the anterior portion of which latter equals from 1/2 to 2/3 of that of the body. Pectoral 2/3 as long as the head. Ventral nearly as long as the head. Anal commences below the middle of the soft dorsal. Caudal forked. *Scales*—minute. *Colours*—bluish gray, with five vertical black bands from the back down the body, and which have a rather anterior direction above the lateral-line: one or two similar but narrower bands on the head. First dorsal fin black, second dorsal dark, becoming black near its summit and with a white tip. Pectoral yellow. Ventral and anal black, the latter with a white tip. Caudal yellowish, the young having a black blotch in the last portion of either caudal lobe.

Jerdon (M. J. L. and Sc. 1851, p. 137) observes on the affinity of the Madras fish with *S. binotata*, C.V. and terms it *Mooskoom parah*, Tamil.

Seriola Dussumieri, C.V. ix, p. 217, D. 5 | $\frac{1}{27}$, A. 2 | $\frac{1}{18}$, may be the young of this species, the specimens from the Bay of Bengal being only 2 inches in length, but having 7 vertical brown bands. There is however in the Madras Museum a stuffed specimen 22 inches in length, having D. 5 | $\frac{1}{32}$, A. 2 | $\frac{1}{16}$. Eyes, diameter 2/7 of length of head, 1 diameter from end of snout, a slight keel on the side of the tail, and which appears different from *S. nigrofasciata.* I have also a skin 12 inches long, in a bad state, from the same place. The ventrals are shorter than in *S. nigrofasciata.*

Habitat.—Red Sea, East coast of Africa, seas of India to the Malay Archipelago and beyond. The one figured (life-size) was captured in Madras in February, 1867, they are not rare.

Genus, 4—Seriolichthys, *Bleeker.*

Decaptus, Poey.

Branchiostegals seven. Body oblong, compressed: abdomen rounded. Cleft of mouth of moderate depth. Preopercle slightly crenulated or entire. Villiform teeth on the jaws, vomer, and palatines. First dorsal fin continuous, the second and the anal with many more rays, and each having one or two finlets posteriorly: a pair of pre-anal spines remote from the rest of the fin may be present or absent. Scales cycloid, small. Lateral-line unarmed.

Geographical distribution.—From the East coast of Africa, through the seas of India, to the Malay Archipelago and beyond.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Seriolichthys bipinnulatus*, D. 6 | $\frac{1}{24-25}$+i, A. 0-2 | $\frac{1-2}{16-17}$+i. Two longitudinal bands, one from the eye to the end of the dorsal, the second to the middle of the caudal fin. Seas of India.

1. Seriolichthys bipinnulatus, Plate LI, A. fig. 1.

Seriola bipinnulata, Quoy and Gaim, Voy. Uranie, Zool. i, p. 363, pl. 61, f. 3; Cuv. Règ. Anim. Ill. Poiss. p. 130; Jenyns, Voy. Beagle, Fishes, p. 72.

Elagatis bipinnulatus, Benn. Whaling Voyage, ii, p. 283.

Seriolichthys bipinnulatus, Bleeker, Nat. Tyds. Ned. Ind. vi, p. 196; Günther, Catal. ii, p. 468; Klunz. Verh. z. b. Ges. Wien, 1871, p. 452.

Seriolichthys lineolatus, Day, Proc. Zool. Soc. 1867, p. 559.

Kalul, Tam.

B. vii, D. 5 | $\frac{1}{24-25}$ + i, P. 21, V. 1/5, A. 0-2 | $\frac{1-2}{16-17}$ + i, C. 18, L. l. 95, L. tr. 16/28.

Length of head 1/5, of caudal 1/4 to 4/17, height of body 1/5 of the total length. *Eyes*—diameter 1/4 of length of head, $1\frac{1}{4}$ diameters from end of snout, and also apart. Body elongated and compressed, its greatest height being opposite the origin of the soft dorsal fin. Lower jaw slightly the longer, gape of mouth rather narrow, the maxilla reaches to below the front edge of the eye. Gill-openings cleft as far forwards as to below the anterior edge of the orbit. *Teeth*—villiform in jaws, vomer, palatines, and on the tongue. *Fins*—dorsal spines of moderate strength, low, with the interspinous membrane deeply cleft. Anterior portion of second dorsal highest, equalling 2/5 of that of the body, at a short distance behind this fin are two rays placed close together and forming a finlet, they are rather elongated and reach the root of the caudal fin. Pectoral short, equalling 1/9 of the total length. Anal of the same form but anteriorly lower than the soft dorsal, being 2/7 of the height of the body, it has similarly a posterior finlet. Caudal deeply forked, its middle rays being only equal to 2/7 of its outer ones. *Scales*—on cheeks, upper edge of opercles, behind the eyes, and over the body. *Colours*—two longitudinal blue bands pass from the eye, the upper to the dorsal finlet, and the lower to the centre of the base of the caudal fin.

Günther (Catal. l. c.) gives two pre-anal spines. Not finding any in Madras specimens, I concluded they belonged to a distinct species: however, since then I see in the "Fishes of Zanzibar," p. 62, that it is observed, "Bleeker's statement that there are two pre-anal spines separate from the remainder of that fin requires further confirmation." The fish mentioned by Jerdon, M. J. L. and Sc. 1851, p. 136, as *Poon kolal*, Tamil, is this species.

Habitat.—From the East coast of Africa, through the seas of India, to the Malay Archipelago and beyond. It attains several feet in length. The specimen figured (nearly 12 inches long) is from Madras.

Genus, 5—Naucrates, *Cuv.*

Nauclerus, Cuv. and Val. *(young)*.

Branchiostegals seven. Body oblong, sub-cylindrical. Cleft of mouth moderate. In the very young there is a spine at the angle of the preopercle, which becomes absorbed as age advances. Villiform teeth in the jaws, vomer, and palatine bones. The first dorsal fin, which is continuous in the young, becomes reduced to a few spines in the adult: the second dorsal and anal with many rays; no spurious fins: in the young two pre-anal spines remote from the soft fin, and which become lost with age. Scales small: lateral-line unarmed: a keel on either side of the tail. Air-vessel present. Pyloric appendages in moderate numbers.

The natural position of this Genus has been subjected to several changes. It is amongst the *Scombridæ* in Cuv. and Val.'s grand work, and Günther in his "Catalogue of Fishes," left *Naucrates* in the same family, but

included *Nauclerus* amongst the *Carangidæ*. Gill and Kner distinctly proved *Nauclerus* to be the young of *Naucrates*, in which the authors of the "Fishes of Zanzibar," p. 63, acquiesced and referred the Genus to *Carangidæ*.*

Habitat.—These "pilot fishes" are spread through all the seas of temperate and tropical regions. Most travellers in sailing vessels have seen them as close attendants upon sharks, leading them, as the sailors consider, to their prey.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Naucrates ductor*, D. 3-6 | $\frac{1}{26-28}$, A. 0-2 | $\frac{2}{16-17}$. Five to seven broad bluish vertical bands on the body.

1. Naucrates ductor, Plate LI, A. fig. 2.

Gasterosteus ductor, Linn. Syst. Nat. p. 489; Brun. Pisc. Mass. p. 67; Bennett, Whaling Voyage, ii, p. 274.

Gasterosteus antecessor, Dald. Skrivt. Nat. Selsk. Kjob. ii, p. 166.

Scomber ductor, Bl. t. 338; Hasselq. Iter, p. 336; Mitchell, Trans. Lit. and Phil. Soc. New York, i, p. 424.

Scomber Koelreuteri, Bl. Schn. p. 570.

Centronotus conductor, Lacép. iii, p. 311; Risso. Ich. Nice, p. 428, and Eur. Merid. iii, p. 193; Conch. Trans. Linn. Soc. xiv, p. 82.

Naucrates ductor, Cuv. and Val. viii, p. 312, pl. 232; Yarrell, Brit. Fish. i, p. 170; Guichen, Exp. Algér. Poiss. p. 60; Günther, Catal. ii, p. 374; Klunz. Verh. z. b. Ges. Wien, 1871, p. 445.

Naucrates Noveboracensis, Cuv. and Val. viii, p. 325.

Naucrates Indicus, Cuv. and Val. viii, p. 326; Cuv. Règ. Anim. Ill. Poiss. pl. 54, f. 1; Less. Voy. Coq. Zool. Poiss. p. 157, pl. xiv; Richards. Ich. China, p. 269; Kner, Novara Fische, p. 145.

Naucrates Koelreuteri, Cuv. and Val. viii, 327.

Nauclerus compressus, Cuv. and Val. ix, p. 249, pl. 263; Günther, Catal. ii, p. 469 (*? young*).

Thynnus pompilus, Gronov. ed. Gray, p. 123.

B. vii, D. 3-6 | $\frac{1}{26-28}$, P. 21, V. 1/5, A. 0-2 | $\frac{2}{16-17}$, C. 17, Cæc. pyl. 12-15, Vert. 10/16.

Length of head $1\frac{1}{4}$ to 2/9, of pectoral 1/8, of caudal 2/11, height of body 1/4 to 2/9 of the total length. *Eyes*—diameter 1/5 of length of head, $1\frac{1}{2}$ diameters from end of snout. The greatest width of the head equals 3/5 of its length, and its height equals its length behind the posterior nostril. The maxilla extends to below the anterior edge of the orbit. *Teeth*—villiform in jaws, in a pyriform band on vomer, and a long patch on the palatines, tongue rough. *Fins*—first dorsal spine short, second dorsal highest anteriorly, anal commences under the middle of the second dorsal. Pectoral as long as the ventral, which reaches 2/5 of way to the base of the anal. Caudal deeply forked. *Scales*—cycloid. *Lateral-line*—a little raised on the side of the tail. *Colours*—bluish, with five or six dark vertical bands: caudal sometimes with the ends of the lobes white, and having a dark band across their last third. Basal half of anal and centre of dorsal dark gray.

Nauclerus abbreviatus, C.V. Lowe, Günther: *N. brachycentrus*, *triacanthus*, *annularis*, and *leucurus*, C.V. and Günther, are all probably young of this or closely allied species, having two pre-anal spines, and a more or less serrated preopercle, &c.

Habitat.—Seas of temperate and tropical regions. A specimen 7 inches long of the "pilot fish" is in the Calcutta Museum, taken in the Indian Ocean by J. Hart, Esq., of the "Inflexible."

Genus, 6—Chorinemus, *Cuv. and Val.*

Scomberoides, Lacép.

Branchiostegals seven or eight: pseudobranchiæ. Body oblong and compressed. Eyes lateral. Cleft of mouth moderate or deep. Teeth in jaws, also present on vomer, palatines, and tongue. Two dorsal fins, the first (preceded by an immoveable, recumbent spine, directed forwards) has a groove at its base for its reception, it is formed by a few free spines, but in a less number than the rays of the second dorsal or anal, the posterior rays of both of which last are either detached or semi-detached; a pair of pre-anal spines separated by an interspace from the remainder of the fin. Dermal scales mostly lanceolate. Lateral-line continuous, not keeled. Air-vessel bifurcated posteriorly. Pyloric appendages numerous.

Geographical distribution.—Red Sea, seas of India to the Malay Archipelago: also found in tropical parts of the Atlantic.

Although this Genus is as a rule marine, the young ascend estuaries and tidal rivers, and it is not uncommon to find them in the Hoogly at Calcutta. As food they are dry and rather tasteless, in this respect resembling *Trachynotus*.

* "A second question arises, whether *Naucrates* should be referred to *Scombridæ* or *Carangidæ*. The two anal spines of the young are separate from the soft portion: and although the number of caudal vertebræ is increased by two, yet the number of abdominal vertebræ remains the same: we are therefore inclined to remove this genus from the *Scombridæ* to the *Carangidæ*." (Fish. Zanz. p. 63.) Bleeker in the Family Lichoidei includes *Naucrates*, *Chorinemus*, *Trachynotus*, and *Elacate*.

SYNOPSIS OF SPECIES.

1. *Chorinemus Sancti-Petri*, D. 7 | $\frac{1}{19-21}$, A. 2 | $\frac{1}{18-19}$. Height of body $4\frac{1}{4}$ to $4\frac{2}{3}$ in the total length. Maxilla reaches to below hind edge of orbit. No enlarged teeth: in a triangular patch on the vomer elongated posteriorly. Dorsal spines flattened and do not overlap in the adult. Scales lanceolate and pointed. A single row of dark blotches above the lateral-line and sometimes a second below it: summit of soft dorsal black. Red Sea, seas of India to the Malay Archipelago and beyond.

2. *Chorinemus moadetta*, D. 7 | $\frac{1}{21}$, A. 2 | $\frac{1}{18-19}$. Height of body $5\frac{1}{4}$ in the total length. Maxilla reaches to below last third of orbit. Canine-like teeth in front of either jaw: an elongated oval patch on vomer. Dorsal spines rounded and overlap. Scales like needles lying close together. A single row of dark blotches above the lateral-line: summit of soft dorsal black. Seas of India.

3. *Chorinemus lysan*, D. 7 | $\frac{1}{19-20}$, A. 2 | $\frac{1}{17-18}$. Height of body 1/4 of the total length. Maxilla reaches to beyond the hind edge of the orbit. No enlarged teeth in jaws: in a triangular spot on vomer, having a posterior prolongation. Dorsal spines overlap. Scales lanceolate; six or eight large, round, gray marks on the side: summit of soft dorsal black. Red Sea, seas of India to the Malay Archipelago and beyond.

4. *Chorinemus tala*, D. 7 | $\frac{1}{20}$, A. 2 | $\frac{1}{17}$. Height of body $3\frac{2}{3}$ in the total length. Maxilla reaches to below hind edge of the eye. Strong canines in either jaw: in a quadrangular patch of villiform ones on the vomer. Dorsal spines overlap. Scales lanceolate and pointed. A row of dark spots along the sides. Summit of second dorsal black. Seas of India.

5. *Chorinemus toloo*, D. 7 | $\frac{1}{19-20}$, A. 2 | $\frac{1}{17-18}$. Height of body $3\frac{1}{2}$ to $3\frac{2}{3}$ in the total length. Maxilla reaches to nearly or quite below the hind edge of the eye. No enlarged teeth in the jaws: in a triangular patch on the vomer. Dorsal spines overlap. Scales lanceolate. A row of dark spots along the sides. Vertical fins darkish. Seas of India to the Andamans.

1. Chorinemus Sancti-Petri.

Cuv. and Val. viii, p. 379, pl. 236; Bleeker, Makr. p. 45; Jerdon, M. J. L. and Sc. 1851, p. 136; Peters, Wieg. Arch. 1855, p. 245; Günther, Catal. ii, p. 473 (part).

Thynnus Moluccensis, Gronov. ed. Gray, p. 121.

Scomberoides sancti-petri, Bleeker, Bintang, 1868, p. 4.

B. viii, D. 7 | $\frac{1}{19-21}$, P. 17, V. 1/5, A. 2 | $\frac{1}{18-19}$, C. 15.

Length of head $5\frac{1}{4}$ to $5\frac{3}{4}$, of pectoral $4\frac{1}{2}$, of caudal $4\frac{1}{2}$, height of body $4\frac{1}{4}$ to $4\frac{2}{3}$ in the total length. *Eyes*—diameter one-fourth to $4\frac{1}{2}$ in length of head, 1 to $1\frac{1}{4}$ diameters from end of snout, and also apart. Greatest width of head equals 2/5 of its length, and its height its length posterior to the hind nostril. Profile above orbit slightly concave. The maxilla reaches to beneath the hind edge of the orbit, it is concealed by the preorbital except in the last third of its course. Central longitudinal crest on the skull scarcely elevated. Angle of preopercle slightly produced. *Teeth*—in several villiform rows anteriorly in both jaws, becoming a single one in the last 2/3 of the premaxillaries: in two rows in the lower jaw: in a triangular patch, elongated posteriorly, on the vomer: in a pyriform band, largest anteriorly, on the palatines, and also on the tongue. *Fins*—the spines of the first dorsal are flattened, laterally expanded into a lanceolate form, and have a keel along their centre: in the adult one spine does not extend so far as to the base of the next before it, but they slightly overlap in the young. Second dorsal commences midway between the snout and the front nostril, its first portion is elevated and equals 4/9 of that of the body, and is 1/5 higher than the commencement of the anal. Ventral reaches half way to the anal. Caudal deeply lobed. *Scales*—lanceolate and pointed in their exposed portions, which have a line along their centre and the posterior part depressed, behind the exposed lanceolate portion each scale ends in a narrow pedicle rather more than half its entire length. In the young they are not quite so pointed and when removed appear much like a spoon. *Lateral-line*—makes an obtuse angle opposite the middle of the pectoral fin, from thence it gradually slopes downwards, becoming straight beneath the first dorsal ray. *Colours*—a bluish-gray spot on the opercle, and a row of from 6 to 8 dark blotches above the lateral-line: sometimes, more especially in the adult, a second row beneath it. Summit of soft dorsal black.

Habitat.—Red Sea, East coast of Africa, seas of India to the Malay Archipelago and beyond. It attains at least 20 inches in length.

2. Chorinemus moadetta, Plate LI, B. fig. 1.

Scomber tol parah, Russell, Fish. Vizag. ii, p. 29, pl. 138.

Chorinemus moadetta, Cuv. and Val. viii, p. 382; Rüpp. N. W. Fische, p. 45; Klunz. Verh. z. b. Ges. Wien, 1871, p. 448.

Chorinemus tol, Cuv. and Val. viii, p. 385; Cantor, Catal. p. 119; Jerdon, M. J. L. and Sc. 1851, p. 136; Günther, Catal. ii, p. 473; Day, Fish. Malabar, p. 93; Kner, Novara Fische, p. 162.

Chorinemus Sancti-Petri, Günther, Catal. ii, p. 473 (pt.); Day, Fish. Malabar, p. 95.

B. viii, D. 7 | $\frac{1}{21}$, P. 19, V. 1/5, A. 2 | $\frac{1}{18-19}$, C. 17.

Length of head $5\frac{2}{3}$ to $5\frac{3}{4}$, of caudal $6\frac{1}{2}$, height of body $5\frac{1}{4}$ in the total length. *Eyes*—diameter $4\frac{1}{4}$ to one-fifth in length of head, $1\frac{1}{4}$ diameters from end of snout, and also apart. Dorsal profile rather more convex than that of the abdomen, and rather concave above the orbits, the central and lateral ridges on the summit of

the head well developed. The lower jaw somewhat the longer, the cleft of the mouth commences opposite the middle of the eyes, the maxilla (which is uncovered from beneath the first third of the eyes) reaches to beneath the last third of the orbit.* Greatest depth of preorbital equals 1/3 of the diameter of the orbit. *Teeth*—in the premaxillaries in a single row, the two anterior ones of which are large and rather canine-like, posteriorly to these are some villiform ones: teeth in the lower jaw in two rows, the outer of which is curved rather outwards and upwards, whilst there are enlarged ones on either side of the symphysis: an elongated ovate patch on the vomer having an anterior-posterior direction: in a long pyriform band on the palate largest anteriorly, also on the tongue. *Fins*—dorsal spines rounded, not flattened, overlapping and twisting laterally when elevated. Second dorsal commences midway between the anterior edge of the eye and the base of the caudal fin, its first portion is the highest equalling $2\frac{1}{3}$ in that of the body, and 1/3 higher than the first part of the anal. Pectoral as long as the head behind the middle of the eye. Ventral reaches 2/5 of the way to the anal. Caudal deeply forked. *Scales*—are peculiar, resembling needles sharp at both ends, lying close together and interdigitating, it is only near the free portion of the tail that they become at all scale-like. *Lateral-line*—rather indistinct and almost straight, making one slight angular elevation above the last third of the pectoral. *Colours*—silvery along the upper third of the body, becoming white on the sides and below, a series of 6 or 8 blotches along the sides, mostly above the lateral-line. A black blotch at the highest point of the second dorsal and the ends of either lobe of the caudal, the other fins yellow.

This species in its external form resembles *C. Sancti-Petri*, C. V., but its scales are entirely different, corresponding apparently to *C. Mauritianus*, in which they are said to be smooth requiring a magnifying glass to detect, as under the naked eye they merely resemble pores. Likewise it appears to be *C. tol*, in which the mode of scaling as existing in this species is described, but the mouth is said only to be cleft below the front edge of the eye. Russell observes that *Scomber tol parah* is without scales. *Chorinemus tol* of Cantor and Jerdon is identical with the *C. moadetta*. It is also termed *Toal parah* or "leather skin" by the natives.

Habitat.—Red Sea, east coast of Africa, and seas of India, attaining upwards of 15 inches in length. As food its flesh is dry and tasteless.

3. Chorinemus lysan.

Scomber lysan, Forsk. No. 67, pl. 54.
Scomber Forsteri, Bl. Schn. p. 26.
Scomberoides Commersonianus, Lacép. ii, pl. 20, f. 3.
Scomber aken parah, Russell, Fish. Vizag. ii, p. 31, pl. 141.
Scomber Madagascariensis, Shaw, Zool. iv, p. 590, pl. 85; Bennett, Life of Raffles, p. 689.
Lichia lysan, Rüpp. Atl. Fische, p. 91.
Chorinemus Commersonianus, Cuv. and Val. viii, p. 370; Bleeker, Makr. p. 44; Jerdon, M. J. L. and Sc. 1851, p. 136.
Chorinemus lysan, Cuv. and Val. viii, p. 387; Rüppell, N. W. Fische, p. 44; Cantor, Catal. p. 118; Günther, Catal. ii, p. 471; Day, Fish. Malabar, p. 92; Kner, Novara Fische, p. 163; Klunz. Verh. z. b. Ges. Wien, 1871, p. 448.
? Chorinemus Farkharii, Cuv. and Val. viii, p. 388.
Chorinemus aculeatus, Cuv. and Val. viii, p. 384.
Toal parah, Tam.; *Parah*, Hind.

B. viii, D. 7 | $\frac{1}{19-20}$, P. 19, V. 1/5, A. 2 | $\frac{1}{17-18}$, C. 19, Vert. 10/16.

Length of head $5\frac{1}{2}$ to one-sixth, of caudal two-ninths, height of body $3\frac{1}{4}$ to one-fourth in the total length. *Eyes*—diameter 1/4 of length of head, 1/2 to 2/3 of a diameter from end of snout, and rather above 1 apart. Greatest width of head $2\frac{1}{4}$ in its length, whilst its height almost equals its length. Body rather strongly compressed, profile over nape slightly concave. Cleft of mouth deep, the maxilla extending nearly half a diameter behind the orbit, the maxilla is narrow and uncovered by the preorbital from beneath the first third of the eye. The length of the premaxillary is 4/7 of that of the head. *Teeth*—anteriorly in two rows, posteriorly in one in the premaxillaries: in two rows in the lower jaw, the outer of which is directed outwards and upwards in the young, some of the anterior teeth in both jaws are rather enlarged: in a triangular spot rather prolonged posteriorly in the vomer: in a pyriform band, largest anteriorly, on the palatines, also on the tongue. *Fins*—the anterior portions of the soft dorsal and anal elevated, equalling 4/5 of the length of the head, the last 8 or 10 rays semi-detached, the last rather elongated. Caudal deeply forked. *Scales*—distinct and lanceolate. *Lateral-line*—has a slight angular elevation soon after its commencement. *Colours*—six to eight large, round, gray spots like finger-marks on the side, the lateral-line sometimes going through the two first, while the others are all above it: summit of soft dorsal black.

Habitat.—Red Sea, seas of India to the Malay Archipelago and beyond; it attains a considerable size.

4. Chorinemus tala.

Scomber tala parah, Russell, Fish. Vizag. ii. p. 30, pl. 140.

* Mouth cleft to below front edge of eye in *C. tol*, according to Russell, Cuv. and Val., Günther, &c.

Chorinemus tala, Cuv. and Val. viii, p. 377; Jerdon, M. J. L. and Sc. 1851, p. 136; Günther, Catal. ii, p. 473; Day, Fish. Malabar, p. 93.

B. viii, D. 7 | $\frac{1}{20}$, P. 19, V. 1/5, A. 2 | $\frac{1}{17}$, C. 17.

Length of head $5\frac{3}{4}$, of caudal $4\frac{3}{4}$, height of body $3\frac{2}{3}$ in the total length. *Eyes*—diameter 1/4 of length of head, 1 diameter from end of snout, and $1\frac{1}{4}$ apart. Greatest width of head equals 3/7, and its height equals 7/8 of its length. Dorsal and abdominal profiles equally convex. Lower jaw prominent: cleft of mouth commences opposite the upper third of the eye: the maxilla (which is uncovered from below the middle of the eye) extends to beneath the hind edge of the eye. Greatest depth of preorbital equals 3/7 of width of orbit. Posterior limb of preopercle nearly vertical, and its angle not produced. *Teeth*—two strong canines directed a little outwards at the symphysis in either premaxillary, and several villiform rows behind them, laterally a single row of rather distantly placed pointed teeth: in the lower jaw at the symphysis are two canines anteriorly pointing a little forward, posteriorly two more directed upwards, laterally two rows of teeth, the inner being considerably the larger: in a quadrangular spot on the vomer, in a pyriform band larger anteriorly on the palatines, and also on the tongue. *Fins*—dorsal spines overlapping and twisting slightly laterally when elevated. Second dorsal commences midway between the nostrils and the base of the caudal, its first portion equals $2\frac{1}{5}$ in the height of the body, and is 1/5 longer than the anterior part of the anal. Pectoral as long as the head without the snout. Ventral reaches 2/5 of the distance to the anal. Caudal deeply forked. *Scales*—rhomboidal, and more or less pointed posteriorly, on being removed the outer half is found to be lanceolate, the posterior more contracted. *Lateral-line*—becomes straight below the middle dorsal spine, in this course it has an angular elevation above the last 2/3 of the pectoral fin. *Colours*—leaden-silvery in the upper third of the back, silvery-white on the sides and below, a series of 7 spots above the middle of the sides, the two first being intersected by the lateral-line. Summit of second dorsal black.

Habitat.—Seas of India, attaining at least $6\frac{1}{2}$ inches in length.

5. **Chorinemus toloo**, Plate LI, A. fig. 3.

Scomber toloo parah, Russell, Fish. Vizag. ii, p. 29, pl. 137.

Chorinemus toloo, Cuv. and Val. viii, p. 377; Günther, Catal. ii, p. 473; Day, Fish. Malabar, p. 96; Klunz. Verh. z. b. Ges. Wien, 1871, p. 447.

B. viii, D. 7 | $\frac{1}{19-20}$, P. 20, V. 1/5, A. 2 | $\frac{1}{17-18}$, C. 19.

Length of head $5\frac{2}{3}$, of pectoral 1/8 to $8\frac{1}{2}$, of caudal $4\frac{1}{2}$ to one-fifth, height of body $3\frac{1}{2}$ to $3\frac{2}{3}$ in the total length. *Eyes*—diameter 2/9 of length of head, 1 diameter from end of snout, and also apart. Body elliptical, compressed; a gradual rise to the first dorsal. Greatest width of head equals $2\frac{1}{3}$ in its length, and its height almost its length. Cleft of mouth commences opposite the upper third of the eye. The maxilla extends to nearly or quite below the posterior margin of the orbit: upper jaw only uncovered in the last 1/3 of its extent: premaxillaries equal to 4/7 of the length of the head. Preorbital narrow, but covering the first 2/3 of the maxilla: preopercle narrow, having its angle rounded and produced. Central crest of the skull distinct. *Teeth*—comparatively large, in a single row in the upper jaw and in two in the lower, the outer of which last is directed somewhat outwards, whilst there are two canine-like teeth on either side of the symphysis of the lower jaw: in a triangular patch on the vomer: an elongated pyriform band, largest anteriorly on the palatines, and on the tongue. *Fins*—the anterior portion of the soft dorsal elevated, similar to the anal, and 1/2 the height of the body, the posterior 8 or 10 rays of either fin semi-detached, and the last rather elongated. Caudal deeply forked. *Scales*—small but distinct, and lanceolate in their exposed portion. *Lateral-line*—has a very slightly raised angle in the first part of its course, but its general direction is straight. *Colours*—greenish tinge along the back shot with blue, becoming of a dull silvery below the lateral-line. Six to eight moderately sized, oval, and indistinct vertical spots or blotches on the side, usually intersected by the lateral-line. Vertical fins darkish.

Habitat.—Seas of India, the specimen figured (11 inches long) is from the Andamans; it is said to attain eighteen inches in length.

Genus, 7—Trachynotus,* *(Lacép.) Cuv. and Val.*

Acanthinion and Cæsiomorus, Lacép.

Branchiostegals seven: pseudobranchiæ absent. Body compressed, more or less elevated, with the frontal region prominent. Eyes lateral. Snout obtuse and swollen: cleft of mouth small. Teeth on the jaws, vomer, and palatines, usually lost with age. Two dorsal fins, the first composed of spines having a small connecting membrane (receivable into a groove at their base), and a horizontal one, directed forwards, anterior to the fin: second dorsal and anal with more rays than spines in the first dorsal: the anterior portion of the second dorsal and anal pointed and elongated: two pre-anal spines separated by an interspace from the remainder of the fin: no finlets. Scales small. Lateral-line unarmed. An air-vessel bifurcated posteriorly. Pyloric appendages numerous, or in moderate numbers.

Geographical distribution.—From the Red Sea, through the seas of India to the Malay Archipelago and beyond.

* *Cultalli*, Tamil.

SYNOPSIS OF SPECIES.

1. *Trachynotus Baillonii*, D. 6-7 | $\frac{1}{22-24}$, A. 2 | $\frac{1}{22-24}$. Short ventral fins, caudal from $3\frac{1}{3}$ to $3\frac{1}{2}$ in the total length: 3 to 5 small black spots on the lateral-line. Red Sea, seas of India to the Malay Archipelago.

2. *Trachynotus Russellii*, D. 6 | $\frac{1}{22-23}$, A. 2 | $\frac{1}{20}$. Comparatively long ventral fins: caudal $4\frac{1}{4}$ to $4\frac{1}{2}$ in the total length: 3 to 5 large and dull roundish blotches above the lateral-line. Seas of India to the Malay Archipelago.

3. *Trachynotus ovatus*, D. 6-7 | $\frac{1}{18-21}$, A. 2 | $\frac{1}{16-19}$. Golden, without blotches. Red Sea, seas of India to the Malay Archipelago and beyond. Also found in the Atlantic, between Africa and America.

1. **Trachynotus Baillonii**, Plate LI, A. fig. 4.

Cæsiomorus Baillonii, Lacép. iii, p. 93, pl. 3. fig. 1.
Cæsiomorus quadripunctatus, Rüpp. Atl. Fische, p. 90, pl. 24, f. 1.
Trachinotus quadripunctatus, Cuv. and Val. viii, p. 434; Cantor, Catal. p. 122.
Trachinotus Bailloni, Cuv. and Val. viii, p. 431; Günther, Catal. ii, p. 484; Day, Fish. Malabar, p. 98; Klunz. Verh. z. b. Ges. Wien, 1871, p. 449.
Vella oodoo and *Parruvu*, Mal.; *Mookalee*, Tamil.

B. vii, D. 6-7 | $\frac{1}{22-24}$, P. 17, V. 1/5, A. 2 | $\frac{1}{22-24}$, C. 19, Cæc. pyl. 12, Vert. 9/12.

Length of head $5\frac{1}{3}$ to $5\frac{1}{2}$, of pectoral one-eighth, of caudal $3\frac{1}{3}$ to $3\frac{1}{2}$, height of body from one-third to $3\frac{1}{2}$ in the total length. *Eyes*—diameter 2/7 to 1/4 of length of head, 1 diameter from end of snout, and $1\frac{1}{4}$ apart. Body elevated and strongly compressed: jaws of equal length: the maxilla nearly reaches to beneath the centre of the orbit. *Teeth*—card-like in both jaws, on vomer, and palatines. *Fins*—the first dorsal spines moderately strong: second dorsal and anal are very much produced in front, and if laid backwards those of the dorsal reach to nearly the end of that fin: those of the anal to its posterior extremity: whilst the last fifteen rays are parallel with the back and abdomen. Pectoral as long as the head, excluding the snout. Ventral small, equalling $1\frac{1}{2}$ diameters of the orbit. Caudal with deeply produced lobes, the upper slightly the longer, the central rays 1/4 the length of the outer ones. *Scales*—small, placed in sinuous lines. *Lateral-line*—nearly straight, and in simple tubes. *Colours*—upper surface of head and back of a silvery yellowish-green, becoming lighter on the sides, and silvery-white on the abdomen, opercles, and checks. Lobes of dorsal, anal, and caudal black, some white likewise on those of the tail: a row of three to five deep black blotches along the sides and on the lateral-line.

Habitat.—Red Sea, East coast of Africa, seas of India to the Malay Archipelago: it attains at least 20 inches in length. The specimen figured is 13 inches long and from Aden.

2. **Trachynotus Russellii**, Plate LI, B. fig. 3.

Scomber botla parah, Russell, Fish. Vizag. ii, p. 32, pl. 142.
Scomber botla, Shaw, Zool. iv, p. 591.*
Trachinotus Russellii, Cuv. and Val. viii, p. 436; Jerdon, M. J. L. and Sc. 1851, p. 136.
Trachinotus oblongus, Cuv. and Val. viii, p. 437; Günther, Catal. ii, p. 484.

B. vii, D. 6 | $\frac{1}{22-23}$, P. 17, V. 1/5, A. 2 | $\frac{1}{20-21}$, C. 17.

Length of head one-fifth to $5\frac{3}{4}$, of caudal one-fourth to $4\frac{1}{2}$, height of body $3\frac{1}{4}$ to $3\frac{2}{3}$ in the total length. *Eyes*—diameter $3\frac{1}{2}$ to $3\frac{3}{4}$ in the length of head, about 1 diameter from end of snout, and $1\frac{1}{4}$ apart. Dorsal and abdominal profiles about equally convex, snout obtuse. Height of head equals its length. Jaws of about equal length, the cleft of the mouth commences opposite the middle or lower third of the front edge of the orbit, and the maxilla reaches to beneath the centre of the eye. Preorbital at its widest part equals the width of the maxilla. Central longitudinal crest on the head well developed. *Teeth*—fine ones on jaws, vomer, and palatines, even in fish 22 inches long. *Fins*—spines of first dorsal of moderate strength: anterior rays of second dorsal prolonged, equalling 2/3 or 3/4 of the length of the base of the fin, and being similar to those of the anal. Pectoral rounded, as long as the head without the snout, or behind the middle of the eyes. Ventrals as long as the postorbital portion of the head in the adult, rather longer in the young, they reach above half-way to the anal in the young, but are not quite so long in the adult. Caudal deeply forked, the central rays equalling 1/3 of those of the longest outer ones in the young, but 1/4 or even less in the adult. *Scales*—in irregular rows, small. *Lateral-line*—nearly straight. *Colours*—greenish, dashed with yellow on the back, becoming more golden on the sides and beneath: usually a dark blotch at the upper margin of opercle and commencement of the lateral-line. From 3 to 5 large, dull, rounded blotches a little distance above the lateral-line, but which often disappear after death: they are much darker and more persistent in the adult than in the young: elongated portions of dorsal and anal fins, also lobes of caudal, orange stained with black.

This species can at once be distinguished from *T. Baillonii* by the spots being above, not on, the lateral-line, and by its much longer ventral fins.

Amongst Sir Walter Elliot's drawings of Indian Fishes is one of this genus, having the dorsals black, and a black band along the anal. The soft dorsal is scarcely higher than the spinous, but the figure is scarcely 2 inches in length.

Habitat.—Seas of India to the Malay Archipelago. It is not uncommon at Madras, my largest specimen being 22 inches long, from Canara: specimen figured 13 inches long.

* Shaw observes "var. ? pl. 137" in Russell's Fish. Vizag. which is *Chorinemus toloo*.

3. **Trachynotus ovatus**,* Plate LI, B. fig. 2.

Gasterosteus ovatus, Lin. Syst. Nat. i, p. 490.
Cæsionorus Blochii, Lacép. iii, p. 95, pl. iii, f. 2.
Centronotus ovalis, Lacép. iii, pp. 309, 316.
Scomber falcatus, Forsk. p. 57.
Scomber mookalee-parah, Russell, Fish. Vizag. ii, p. 39, pl. 154.
Trachinotus falcatus, Lacép. iii, p. 79; Rüpp. Atl. Fische, p. 89; Cuv. and Val. viii, p. 430.
Trachinotus mookalee, Cuv. and Val. viii, p. 423; Cantor, Catal. p. 120; Jerdon, M. J. L. and Sc. 1851, p. 136.
Trachinotus Blochii, Cuv. and Val. viii, p. 425.
Trachinotus affinis and *falcifer*, Cuv. and Val. viii, p. 428.
Trachinotus drepanis, Cuv. and Val. viii, p. 429.
Trachynotus ovatus, Günther, Catal. ii, p. 481; Day, Fish. Mal. p. 97; Steind. Ak. Wien, 1869, p. 709; Kner, Novara Fische, p. 164; Klunz. Verh. z. b. Ges. Wien, 1871, p. 449.
Kootili, Tamil.

B. vii, D. 6-7 | $\frac{1}{18-21}$, P. 17, V. 1/5, A. 2 | $\frac{1}{16-19}$, C. 17, Cæc. pylori 12.

Length of head 2/9, of pectoral 1/8, of caudal 1/4, height of body 1/2 to 3/7 of the total length. *Eyes*—in centre of height of head, diameter 1/3 to 2/9 of length of head, 1/2 of a diameter in the young to $1\frac{1}{4}$ in the adult from end of snout, and $1\frac{1}{4}$ apart. Body elliptical and compressed, snout obtuse; a considerable rise from it to the first dorsal, but superior and inferior profiles of body equally convex. Mouth oblique: maxilla reaching to beneath the centre of the orbit. *Teeth*—in young specimens a band of card-like ones in both jaws, but as the fish increases in size (as eight inches in length) they disappear, as well as those on the vomer and palatine bones. *Fins*—second dorsal having its first ray highest, and equalling 1/2 the height of the body, its last portion or two-thirds parallel with the curve of the back. Ventrals in the young as long as the head behind the middle of the eyes. Caudal with deep lobes, its central rays equal 2/5 of its outer ones. *Scales*—minute. *Lateral-line*—at first very slightly ascends, and then forms a slight curve to opposite the eleventh dorsal ray, from whence it proceeds straight to the centre of the caudal. *Colours*—more or less golden colour: the upper half of the first five dorsal rays tipped with black, and the fin generally with minute black points: sometimes the anal and caudal are similarly marked. Pectoral gray in its first three quarters, its last fourth yellow.

Amongst Sir Walter Elliot's drawings of Indian Fishes is one of the young of this species (2 inches long) showing the soft dorsal black, and a dark band along the anal.

Habitat.—Red Sea, East coast of Africa, through the seas of India to the Malay Archipelago and beyond: it attains at least 20 inches in length. This fish salts well, but when fresh is dry and insipid.

Genus, 8—PSETTUS† *(Comm.)*, *Cuv. and Val.*

Monodactylus, Lacép.

Branchiostegals six: pseudobranchiæ. Body much compressed and elevated. Eyes lateral. Cleft of mouth small, snout short. Teeth villiform on jaws, vomer, palatine bones, and tongue. A single dorsal fin with seven or eight spines: anal with three, continuous with the rest of the fin: ventrals rudimentary. Scales small, covering the vertical fins. Lateral-line unarmed. Air-vessel present, bifurcated posteriorly. Cæcal appendages numerous.

Geographical distribution.—Red Sea, East coast of Africa, seas of India to the Malay Archipelago and beyond.

SYNOPSIS OF SPECIES.

1. *Psettus falciformis*, D. $\frac{8}{28-30}$, A. $\frac{3}{29}$, L. l. 100. Height of body half to $2\frac{1}{6}$ in the total length. Silvery. Red Sea, seas of India and beyond.
2. *Psettus argenteus*, D. $\frac{8}{28-30}$, A. $\frac{3}{28-30}$, L. l. 75. Height of body 2/3 of the total length. Silvery. A black ocular band and a second from the dorsal spine to opercle. Red Sea, seas of India and beyond.

1. **Psettus falciformis**, Plate LI, A. fig. 6.

Monodactylus falciformis, Lacép. iii, pp. 131, 132, 133.
Psettus Commersonii, Cuv. and Val. vii, p. 250.
Psettus falciformis, Günther, Catal. ii, p. 488; Day, Fish. Malabar, p. 100.
Purrandee, Mal.

B. vi, D. $\frac{8}{28-30}$, P. 16, V. 1/3-5, A. $\frac{3}{29}$, C. 17, L. l. 100.

Length of head one-fourth to $4\frac{1}{3}$, of caudal $4\frac{1}{3}$ to one-fifth, height of body half to $2\frac{1}{6}$ in the total length. *Eyes*—diameter $2\frac{1}{2}$ in length of head, 1/2 a diameter from end of snout, and 1 apart. Cleft of mouth oblique,

* The synonymy of the Atlantic species is not inserted amongst the above, see *Chætodon rhomboides*, Bl. t. 209: *Acanthinion rhomboides*, Lacép.: *Trachinotus rhomboides, fuscus* and *teraia*, C. and V.: *T. spinosus*, Dekay: *Lichia spinosa*, Baird: *Doliodon spinosus*, Gerard.

† Family PSETTOIDEI, Bleeker.

the maxilla reaches to below the front edge or first third of the eye. Angle of preoperele rounded and finely serrated. Greatest depth of preorbital equals 1/3 of the diameter of the eye. *Teeth*—villiform and in numerous rows in both jaws, present on vomer, palate, and tongue. *Fins*—dorsal spines nearly eoneealed, anterior rays elevated anteriorly. Pectoral 2/3 as long as the head. Ventrals plaeed elose together like two spines, the rays being minute. Anal of the same form as the dorsal, its anterior portion as high as the head is long. Caudal rather deeply emarginate. *Scales*—about 120 rows descend to the lateral-line. *Lateral-line*—forms a long arch becoming straight on free portion of the tail. *Colours*—silvery, soft dorsal and anal tinged with black.

Habitat.—Red Sea, seas of India and beyond: attaining at least 9 inches in length. The specimen figured (from Madras) is $6\frac{1}{2}$ inches in length.

2. **Psettus argenteus,** Plate LI, B. fig. 5.

Chætodon argenteus, Linn. Amœn. Acad. iv, p. 249; Bl. Schn. p. 230.
Scomber rhombeus, Forsk. p. 58; Shaw, Zool. iv, p. 595.
Centrogaster rhombeus, Gmel. Linn. p. 1338.
Acanthopodus argenteus, Lacép. iv, pp. 558, 559.
Centropodus rhombeus, Lacép. iii, pp. 303, 304.
Zeus kanki-sandawa, Russell, Fish. Vizag. i, p. 47, pl. 59.
Psettus rhombeus, Cuv. and Val. vii, p. 245; Cuv. Règ. Anim. Ill. Poiss. pl. xlii, f. 2; Bleeker, Chætod. p. 29; Peters, Wieg. Arch. 1855, p. 247.
Monodactylus rhombeus, Griffith in Cuv. An. King. Fishes, pl. 55, f. 2; Swainson, Fishes, ii, p. 212; Cantor, Catal. p. 172.
Psettus argenteus, Richards. Voy. Erebus and Terror, Fishes, p. 57, pl. 35, f. 1-3; Günther, Catal. ii, p. 487; Day, Fishes of Malabar, p. 99; Kner, Novara Fische, p. 164; Klunz. Verh. z. b. Ges. Wien, 1871, p. 794.
Monodactylus argenteus, Bleeker, Fish. Madagascar, p. 65.
Nga-pus-soond, Mugh.; *Oo-chra-dah*, Andam.

B. vi, D. $\frac{8}{28-30}$, P. 17, V. $\frac{1}{2-3}$, A. $\frac{3}{28-30}$, C. 17, L. l. $\frac{105}{75}$.

Length of head one-fourth to $4\frac{1}{3}$, of caudal $4\frac{1}{3}$, height of body $1\frac{1}{2}$ in the total length. *Eyes*—diameter $2\frac{1}{3}$ in length of head, 1/3 of a diameter from end of snout, and 1 apart. Cleft of mouth oblique, lower jaw the longer, the maxilla reaches to below the front edge of the eye. Angle of preoperele rather angular and finely serrated. Greatest depth of preorbital equals 2/7 of the diameter of the eye. *Teeth*—villiform and in numerous rows in both jaws: present on vomer, palatines, and tongue. *Fins*—anterior dorsal rays elevated, equalling 1/5 more than those of the anal. Pectoral as long as the head exeluding the snout. Ventrals placed close together like two spines, the rays being minute. Anterior anal rays as long as the head. Caudal emarginate. *Lateral-line*—makes a long, low curve, becoming straight nearly below the last fourth of the dorsal fin. *Colours*—silvery with purplish reflections, especially about the anal fin: the baek is of a yellowish green, which after death rapidly assumes a leaden hue. One rather wide black band passes directly downwards from the nape to the eentre of the eye; a second from opposite the three first dorsal spines goes as far as the operele. Some of the dorsal is stained with black, as is also the anterior portion of the anal though to a less extent. Pectoral and ventral colourless: caudal yellow, with a narrow black posterior edge.

Habitat.—Red Sea, East coast of Africa, seas of India to the Malay Archipelago and beyond: it attains at least seven inches in length. Most common in Malabar during the monsoon months. The specimen figured (life-size) is from Madras.

Genus, 9—Platax, *Cuv.* and *Val.*

Branchiostegals six: pseudobranchiæ. Body compressed and much elevated. Eyes lateral. Cleft of mouth small: snout short. Teeth setiform, trilobed at their summits, some also present on the vomer. A single dorsal fin with from three to seven spines, which are nearly hidden: anal with three continuous with the rest of the fin: ventrals well developed. Scales ctenoid, of moderate or small size, extended on to the vertical fins. Lateral-line unarmed. Air-vessel simple. Pyloric appendages few.

These fishes appear to alter considerably with age, their anterior profile becoming more obtuse and their fins comparatively shorter.

SYNOPSIS OF SPECIES.

1. *Platax teira*, D. $\frac{5}{31-33}$, A. $\frac{3}{24-27}$, L. l. 60-65. Snout obtuse, profile from snout to above eyes vertieal. Young with an ocular band as wide as the eye, a second from dorsal spines to between ventral and anal fins: a broad one eovers the last half of the back and sides. Seas of India to Malay Archipelago and beyond.

2. *Platax vespertilio*, D. $\frac{5}{35-37}$, A. $\frac{3}{26-28}$, L. l. 55. Snout not quite vertieal. Young with a narrow ocular band 1/3 as wide as eye: a second from dorsal spines to just before anal: another at commencement of free portion of tail. Red Sea, East coast of Africa, seas of India to the Malay Archipelago and beyond.

1. **Platax teira,** Plate LI, B. fig. 4.

Chætodon teira, Forsk. p. 60, t. 22; Bl. t. 199, f. 1; Gmel. Linn. p. 1265; Bl. Schn. p. 221; Shaw, Zool. iv, p. 345, pl. 48.

Chætodon kahi sandawa, Russell, Fish. Vizag. i, p. 68, pl. 87.

Platax teira, Cuv. Règ. Anim.; Rüpp. Atl. Fische, p. 68, and N. W. Fische, pp. 33, 37: Cuv. and Val. vii, p. 226; Cantor, Catal. p. 168; Bleeker, Chætod. p. 28; Jerdon, M. J. L. and Sc. 1851, p. 133; Peters, Wieg. Arch. 1855, p. 247; Günther, Catal. ii, p. 492; Day, Fish. Malabar, p. 101; Klunz. Verh. z. b. Ges. Wien, 1870, p. 123.

Platax Leschenauldi, Cuv. and Val. vii, p. 223.

Platax vespertilio, Tem. and Schleg. Fauna Japon. Poiss. p. 83, pl. 43.

B. vi, D. $\frac{5}{31-33}$, P. 17, V. 1/5, A. $\frac{3}{24-27}$, C. 17, L. l. $\frac{80-85}{60-65}$ / 75.

The height of the body, excluding the vertical fins, is rather more than, or equal to, its length* excluding the caudal fin. *Eyes*—diameter about 1/3 of length of head, rather above 1 diameter from end of snout, and $1\frac{1}{4}$ apart. Dorsal profile more convex than that of the abdomen, it is very obtuse from the snout to above the eyes. Angle of preopercle rounded and entire. Greatest depth of preorbital equals 2/3 of the diameter of the eye. *Fins*—anterior portions of dorsal and anal fins very prolonged in the young extending (at 6 inches in length) nearly 1/2 the length of the entire fish beyond the end of the caudal fin, and the ventral to the end of the caudal. These fins become comparatively much shorter as age advances. Caudal with its central rays slightly prolonged, making the posterior end of the fin concave in either half. *Colours*—in the *young* grayish, with an ocular band about as wide as the eye passing downwards to the ventral fin: a second broad one from the spines and first few dorsal rays passes downwards behind the head, half going in front the other half behind the pectoral fin, and it is lost between the ventral and anal: a very broad band passes from the last 2/3 of the dorsal fin to the same part of the anal: a narrow band over root of caudal fin. Fins black, exclusive of the pectoral and ventral which are yellow except at their bases. The bands disappear with age.

In a specimen 9 inches long the dorsal, anal, and ventral fins have decreased in length so as to closely resemble the young *P. vespertilio*, (Pl. 51 A, f. 5), but the snout is more obtuse and the scales more numerous.

Habitat.—Seas of India to the Malay Archipelago and beyond. Attaining at least 20 inches in length. Russell says their flavour is excellent, and Cantor makes the same remark.

2. Platax vespertilio, Plate LI, A. fig. 5.

Chætodon vespertilio, Bloch, t. 199, f. 2; Gmel. Linn. p. 1257; Bl. Schn. p. 228; Shaw, Zool. iv, p. 344; Bennett, Fish. Ceylon, p. 5, pl. v.

Platax vespertilio, Cuv. Règ. Anim.; Rüpp. Atl. Fische, p. 143, and N. W. Fische, p. 33; Cantor, Catal. p. 166; Jerdon, M. J. L. and Sc. 1851, p. 133; Peters, Wieg. Arch. 1855, p. 247; Günther, Catal. ii, p. 489.

Platax Gaimardi, Cuv. and Val. vii, p. 216.

Platax guttulatus, Cuv. and Val. vii, p. 227, pl. 186 (*young*).

Platax Reynaldi, Cuv. and Val. vii, p. 219; Jerdon, M. J. L. and Sc. 1851, p. 133; Günther, Catal. ii, p. 490.

Platax albipunctatus, Rüpp. Atl. Fische, p. 69, t. 18, f. 4 (*young*).

Platax Blochii, Cuv. and Val. vii, p. 222; Bleeker, Chætod. p. 27.

Platax Ehrenbergii, Cuv. and Val. vii, p. 221; Rüpp. N. W. Fische, p. 23; Richards. Ich. China, p. 245; Cuv. Règ. Anim. Ill. Poiss. pl. 42, f. 1.

B. vi, D. $\frac{5}{35-37}$, P. 17, V. 1/5, A. $\frac{3}{26-28}$, C. 17, L. l. $\frac{65}{55}$ / 60.

The height of the body, excluding the vertical fins, is rather more than its length excluding the caudal fin. *Eyes*—diameter 1/3 of length of head, 1 diameter from end of snout, and also apart. The dorsal profile more convex than that of the abdomen, it is not quite vertical from the occiput to the snout.† Angle of preopercle rounded, and its lower edge feebly serrated. *Fins*—the anterior portion of the dorsal fin is elevated, and its height exceeds the length of its base by about 1/3 the distance between the snout and its front edge. Pectoral nearly as long as the head. Ventral reaches to about the middle of the base of the anal fin, its length being nearly equal to the anterior portion of the anal, which is 4/5 as high as that of the dorsal. Caudal slightly emarginate. *Scales*—about 65 rows descend to the lateral-line, which contains about 55 tubes: the upper point of the lateral-line below the base of the first dorsal ray is at nearly the junction of the upper and middle third of the height of the body. *Colours*—brownish, fins black, and last two-thirds of pectoral yellow. In the *young* there is a narrow ocular band‡ scarcely above 1/3 the width of the orbit, passing through the eye to the base of the ventral fin: a second, also narrow, from just anterior to the base of the dorsal, descends behind the base of the pectoral towards the anal: a third is over the commencement of the free portion of the tail, and occasionally a fourth at the base of the caudal which is yellow.

I think that Dr. Günther is correct in suggesting *Platax orbicularis* as the adult of this species (see *Chætodon orbicularis*, Forsk. p. 59; *C. pentacanthus*, Lacép. iv, p. 454, pl. 9, f. 2; *Platax orbicularis*, Cuv. and

* Bleeker states both dimensions to be equal: Günther, that the height of the body is more than its length: consequently it may be assumed to vary slightly one way or the other.

† This becomes more pronounced as age advances, when the profile from the eye to the snout is less vertical than in young subjects.

‡ These bands gradually become detached from the specimen if preserved in spirit.

Val. vii, p. 232; Rüpp. Atl. p. 67, t. xviii, f. 3; Bleeker, Sumatra, iv, p. 81; Günther, Catal. ii, p. 490; Klunz. Verh. z. b. Ges. Wien, 1870, p. 793).

Habitat.—Red Sea, East coast of Africa, through the seas of India to the Malay Archipelago and beyond. The one figured (life-size) is from the Andamans.

Genus, 10—Psenes, *Cuv. and Val.*

Branchiostegals, six. Body compressed and elevated, with the frontal region swollen. Eyes lateral. Cleft of mouth shallow, with a short snout. A row of fine teeth in the jaws, none on the palate. Two dorsal fins, the first continuous: the second with more rays and similar to the anal, which last has two or three spines joined to the soft portion of the fin: no finlets. Lateral-line unarmed. Air-vessel bifurcated posteriorly.

Geographical distribution.—Seas of India to the Malay Archipelago and beyond.

SYNOPSIS OF SPECIES.

1. *Psenes Javanicus*, D. 9-10 | $\frac{1}{24-25}$, A. $\frac{3}{24-26}$, L. l. 55. Leaden colour, with dark fins except the pectoral which is yellow. Seas of India to the Malay Archipelago.
2. *Psenes Indicus*, D. 10 | $\frac{1}{14-15}$, A. $\frac{3}{15}$, L. l. 41-43. Silvery. Madras, in the sea.

1. **Psenes Javanicus**, Plate LI, C. fig. 1.

Cuv. and Val. ix, p. 264; Bleeker, Makr. p. 74, and Amboina, 1857, p. 60; Günther, Catal. ii, p. 494.

B. vi, D. 9-10 | $\frac{1}{24-25}$, P. 19, V. 1/5, A. $\frac{3}{24-26}$, C. 17, L. l. 55, L. tr. 15/18.

Length of head 1/4, of pectoral 1/6, of caudal 1/4, height of body 1/3 of the total length. *Eyes*—diameter 1/3 of length of head, 1/2 a diameter from end of snout, and 2/3 of a diameter apart. Dorsal profile elevated, especially above the nostrils. Body compressed. Lower jaw the longer. Cleft of mouth very oblique, commencing opposite the middle or upper third of the front edge of the eye: the maxilla reaches to below the first third of the eye. *Teeth*—in a single row of comparatively large ones in either jaw, palate edentulous. *Fins*—the first dorsal commences above the hind edge of the opercle, the spines are weak, the third being the longest and equal to the anterior dorsal rays or 2/5 the height of the body, the interspinous membrane deeply emarginate. Second dorsal highest anteriorly, the upper margin of its fin rather concave. Pectoral rather pointed. Ventral 1/3 shorter than the pectoral, and almost reaching to the base of the anal fin. Caudal deeply lunated. *Scales*—small and cycloid. *Lateral-line*—nearly straight. *Colours*—generally leaden, dorsal and anal fins black. Pectoral yellow. Caudal with a yellowish tinge.

Psenes auratus, Cuv. and Val. ix, p. 264, has the same number of spines and rays, but the eye is said to be a little larger. M. Dussumier observed that the body is of a golden yellow, tinged with greenish on the snout. The fins greenish, except the pectoral, which is yellow. The specimens were up to 5 inches (French) in length.

Habitat.—Madras, in the sea where it is not uncommon, but the largest specimen I obtained (October, 1867) was $4\frac{1}{2}$ inches in length.

2. **Psenes Indicus**, Plate LIV, fig. 2.

Cubiceps Indicus, Day, Proc. Zool. Soc. 1870, p. 690.

B. vi, D. 10 | $\frac{1}{14-15}$, P. 23, V. 1/5, A. $\frac{3}{15}$, C. 18, L. l. 41-43.

Length of head $3\frac{1}{3}$ to $3\frac{1}{2}$, of caudal $4\frac{1}{2}$ to 5, height of body $2\frac{2}{3}$ to $2\frac{3}{4}$ in the total length. *Eyes*—diameter $2\frac{1}{2}$ to 3 in length of head, 1/3 to 1/2 of a diameter from end of snout, and about 1 apart. Abdominal profile rather more convex than that of the back, body compressed: snout short. Lower jaw the longer, the maxilla reaches to below the front edge of the eye. Cleft of mouth equals half its gape. Preopercle entire: opercle ending in a rounded point and spineless. *Teeth*—in a fine single row in either jaw. *Fins*—dorsal spines feeble, from the second to the fifth subequal in length, 1/3 higher than the soft dorsal fin. Pectoral as long as the head excluding the snout. Ventral reaches above half way to the anal, the spines of which last are low. Caudal deeply forked. *Scales*—very deciduous: some extended on to soft dorsal, anal, and caudal fins. *Lateral-line*—on a row of plate-like scales, the tubes are branched posteriorly. *Colours*—silvery, with a purplish gloss. Spinous dorsal rather dark in its upper part.

Habitat.—Madras, where several specimens were captured in the sea (up to $4\frac{1}{2}$ inches in length) during the month of October.

Genus, 11—Equula,* *Cuv. and Val.*

Leiognathus, Lacép.†

Branchiostegals from five to six: pseudobranchiæ. Body oblong or elevated and strongly compressed. Eyes lateral. Mouth very protractile. Lower edge of preopercle serrated. Minute teeth of equal size in the jaws, some-

* Fishes of this Genus are termed *Caraputty* in Madras, and are eaten salted by natives who are suffering from malarious fevers. At Akyab they are called *Nga-dan-gah.*

† In Cuv. and Val. it is observed that this Generic term was given under the supposition of the jaws being toothless, but as they are invariably toothed it is inadmissible.

times in a single row; palate edentulous. A single dorsal fin, having less spines (8-10) than rays (15-17): anal with three spines continuous with the soft portion, which has less rays (13-14) than the soft dorsal: no finlets: ventrals thoracic. Scales small, cycloid, and sometimes deciduous. Lateral-line unarmed, usually complete, but in some species ceasing beneath the middle or end of the dorsal fin. Air-vessel terminating anteriorly in two horns. Pyloric appendages few.

The species included in this Genus are very similar one with another, but are chiefly to be distinguished by the following points. The comparative length of the head and height of the body to that of the total length. Likewise the length of the dorsal and anal spines. (The length given of these spines in the following species is comparative, as they are liable to considerable variation.) Whether the supraorbital edge is smooth or serrated. If the breast and chest are scaled or scaleless.* If the teeth are in one or more rows. Whilst some have, others have not, a black blotch on the spinous dorsal fin.

Geographical distribution.—Red Sea, seas of India to the Malay Archipelago and beyond.

Uses.—These small fish are extensively sun-dried in India. The salt tax renders refined salt too expensive to be employed in fish-curing by the poorer classes, or the value of the article would be beyond the reach of the consumers. It is also illegal (except along a portion of the Western coast) to collect salt earth for preserving fish. Consequently, as a rule, fish have to be consumed fresh, or if preserved, are mostly only sun-dried. These thin and bony forms are soaked in sea water (which is sometimes partially evaporated previously) and dried in the open air. Of course, being only very slightly cured, they rapidly become putrid, or at any rate greatly deteriorate in moist weather, and if consumed during the monsoon months, are liable to set up visceral irritation as diarrhœa and dysentery.

SYNOPSIS OF SPECIES.

1. *Equula edentula.* Length of head 1/4, height of body half to $2\frac{1}{4}$ in the total length. Supraorbital edge serrated. No scales on chest. No black mark on dorsal fin. Red Sea, seas of India to the Malay Archipelago and beyond.

2. *Equula Dussumieri.* Length of head $4\frac{1}{4}$, height of body $2\frac{1}{2}$ in the total length. Supraorbital edge not serrated. No scales on chest. No black mark on dorsal fin. Seas of India to the Malay Archipelago.

3. *Equula splendens.* Length of head one-fourth, height of body $2\frac{1}{4}$ to $2\frac{1}{3}$ in the total length. Supraorbital edge coarsely serrated. Scales on chest. A deep black blotch on spinous dorsal. Red Sea, seas of India to the Malay Archipelago.

4. *Equula daura.* Length of head $4\frac{1}{2}$, height of body $3\frac{3}{5}$ in the total length. Supraorbital edge not serrated. No scales on chest. Upper half of spinous dorsal black. Seas of India to the Malay Archipelago.

5. *Equula bindus.* Ventral fin very short. Upper half of spinous dorsal orange, with a narrow black basal edging. Coromandel coast of India.

6. *Equula Blochii.* Length of head $4\frac{1}{3}$, height of body $2\frac{3}{4}$ to $3\frac{1}{4}$ in the total length. Supraorbital edge serrated. Chest scaled. A brown blotch over the nape. Seas of India.

7. *Equula brevirostris.* Length of head $4\frac{1}{3}$, height of body $2\frac{2}{3}$ in the total length. Supraorbital edge serrated. Chest scaleless. A brown blotch over the nape. Seas of India.

8. *Equula lineolata.* Length of head $4\frac{1}{4}$, height of body $2\frac{3}{4}$ in the total length. Supraorbital edge not serrated. Chest scaled. No black blotch on spinous dorsal.

9. *Equula insidiatrix.* Length of head from $4\frac{3}{4}$ to one-fifth, height of body from $2\frac{1}{3}$ to $2\frac{2}{3}$ in the total length. Supraorbital edge finely serrated. Chest scaled. A black blotch on upper portion of spinous dorsal: back with rows of spots. Seas of India to the Malay Archipelago.

10. *Equula ruconius.* Length of head $4\frac{1}{3}$, height of body one-half of the total length. Supraorbital edge serrated. Scales very deciduous, much larger than in the last species. Vertical blackish streaks on back: a black blotch on spinous dorsal. Seas of India to the Malay Archipelago.

11. *Equula fasciata.* Length of head 1/4, height of body 2/5 of the total length. Supraorbital edge not serrated. Chest scaleless. No black blotch on spinous dorsal. Seas of India to the Malay Archipelago.

12. *Equula oblonga.* Length of head 4 to $4\frac{1}{3}$, height of body $3\frac{1}{2}$ to 4 in the total length. Supraorbital edge not serrated. Chest scaleless. No black blotch on spinous dorsal. Seas of India to the Malay Archipelago.

1. Equula edentula, Plate LII, fig. 1.

Scomber edentulus, Bl. t. 428; Bl. Schn. p. 36.
Scomber equula, Forsk. p. 58; Bl. Schn. p. 36; Shaw, Zool. iv, p. 587.
Centrogaster equula, Gmel. Linn. p. 1337.
Zeus tottah karah, Russell, Fish. Vizag. i, p. 49, f. 52.
Cæsio equulus, Lacép. iii, pp. 85, 90.
Leiognathus argenteus, Lacép. iv, pp. 448, 449.
Equula ensifera, Cuv. and Val. x, p. 66; Bleeker, Makr. p. 80.

* The chest being scaleless may occasionally be due to the specimen being immature. Sometimes the skin is quite smooth after the scales have been rubbed off. It may be that their presence or absence has no specific value.

Equula caballa, Cuv. and Val. x, p. 73; Rüpp. N. W. Fische, p. 51; Cantor, Catal. p. 146; Jerdon, M. J. L. and Sc. 1851, p. 138; Günther, Catal. ii, p. 499; ? Klunz. Verh. z. b. Ges. Wien, 1871, p. 467.

Equula edentula, Günther, Catal. ii, p. 498; Day, Fish. Malabar, p. 103; Kner, Novara Fische, p. 166; Klunz. Verh. z. b. Ges. Wien, 1871, p. 467.

Equula ruconius, Day, P. Z, S. 1869, p. 302 (not H. B.).

Leiognathus edentulus, Bleeker, Arou, 1873, p. 3.

Tanka chandee, Ooriah: *Nga-hpee-ma*, Burm.

B. v, D. $\frac{8}{15-16}$, P. 20, V. 1/5, A. $\frac{3}{14}$, C. 17, L. l. 60.

Length of head 1/4, of caudal 1/4, height of body 1/2 to two and a fourth of the total length. *Eyes*—diameter 1/3 of length of head, about 1 diameter from end of snout, and also apart. Dorsal profile rather more convex than that of the abdomen: snout obtuse. Interorbital cavity anteriorly rather wide, not quite twice as long as broad. A pair of small spines at the anterior-superior angle of the orbits: the distance between the outer edges of the spines on the orbits in the young equal 2/5 of the length of the head, in the adult 1/3 of the same distance: supraorbital edge minutely serrated. The maxilla reaches to below the front edge of the eye. Lower edge of preopercle very finely serrated. Mandible very concave. *Teeth*—fine. *Fins*—dorsal spines moderately strong, the second is arched, compressed, and nearly equal to 3/4 the length of the head, or 1/6 of the total length: the third and fourth spines anteriorly serrated in their lower portions. Pectoral as long as the head excluding the snout. Ventral nearly, or in the young quite, reaches to the anal. The length of the second anal spine equals that of the head behind the middle of the eyes, or even a little more, the third spine is rather strongly serrated anteriorly in its lower half. *Scales*—small, but distinct, except on the chest or breast, and to a little above the base of the pectoral fin, in which localities they are absent or indistinct:* a large scale at the base of the ventral fin. *Lateral-line*—in about 60 tubes, it first curves upwards, its highest point being below the third dorsal spine, then it arches to below the end of the dorsal fin. Free portion of the tail about as long as high. *Colours*—silvery, grayish along the lateral-line: fine vertical lines from the back down the sides: the soft dorsal stained with gray on its upper edge: base of pectoral stained gray,

Large specimens, as at 8 inches in length, have the height of the body $1\frac{4}{5}$ of the total length, the eye is 2/7 of the length of the head, and $1\frac{1}{4}$ diameters from the end of snout. In one specimen the second dorsal spine is 1/4 longer than the head. It is termed *Soorookoo nam karé*, Tam. Jerdon, *l. c.*

Habitat.—Red Sea, seas of India to the Malay Archipelago and beyond: attaining 10 inches and more in length: it ascends rivers far above tidal reach, but only apparently whilst young.

2. Equula Dussumieri, Plate LII, fig. 2.

Cuv. and Val. x, p. 77, pl. 283; Cuv. Règ. An. Ill. Poiss. pl. 62, f. 1; Swainson, Fishes, ii, p. 250; Jerdon, M. J. L. and Sc. 1851, p. 138; Günther, Catal. ii, p. 500.

B. v, D. $\frac{8}{16}$, P. 21, V. 1/5, A. $\frac{3}{14-15}$, C. 17, L. l. 65.

Length of head $4\frac{1}{4}$, of caudal $4\frac{1}{4}$, height of body $2\frac{1}{2}$ in the total length. *Eyes*—diameter 2/5 of length of head, 3/4 of a diameter from end of snout, and 1 apart. Dorsal and abdominal profiles equally convex. Interorbital cavity anteriorly rather broad, and not twice as long as wide. A pair of small spines at the anterior-superior angle of the orbit. The distance between the two outer spines is $2\frac{2}{3}$ in the length of the head. Orbital margin not serrated. The maxilla reaches to below the first third of the eye. Mandibles inferiorly slightly concave. Lower margin of preopercle rather strongly serrated. *Teeth*—fine, and in several rows in both jaws. *Fins*—the second dorsal spine almost straight and as long as the head excluding the snout, or 1/5 of the total length, the third nearly as long, the front edge of both third and fourth spines serrated in their lower portion. Pectoral as long as the head excluding ohe snout. Ventral does not quite reach the anal. Second anal spine rather weak, it equals the length of the head behind the first third or middle of the eye,† third anal spine a little shorter than the second and serrated anteriorly. Caudal forked. *Scales*—small but distinct, except on the breast and chest, which are scaleless. A moderately strong scale at the base of the ventral. *Lateral-line*—in tubes which anteriorly are distinct, but posteriorly run into one another. *Colours*—silvery, no black spot on dorsal fin: base of pectoral dark, sometimes black. Dark and narrow vertical lines pass from the back over the lateral-line.

Termed *Veri karé*, Tamil. Jerdon, *l. c.*

Habitat.—Seas of India to the Malay Archipelago; attaining at least 8 inches in length.

3. Equula splendens, Plate LII, fig. 3.

Zeus goomorah karah, Russell, Fish. Vizag. i, p. 48, pl. 61.

Equula splendens, Cuv. Règ. Anim.; Cantor, Catal. p. 149; Jerdon, M. J. L. and Sc. 1851, p. 138; Kner, Novara Fische, p. 168; Peters, Mon. Akad. Berlin, 1868, p. 262; Day, Fish. Malabar, p. 104; Klunz. Verh. z. b. Ges. Wien, 1871, p. 467.

* Russell's figure, pl. 63, termed *Equula coma*, C.V. is a *Gazza*. Russell distinctly remarks "The teeth larger than in the former (*E. caballa*=*E. edentula*) and somewhat curved."

† In a specimen $5\frac{1}{4}$ inches long.

Equula gomorah, Cuv. and Val. x, p. 80; Rüpp. N. W. Fische, p. 51; Bleeker, Makr. p. 82.
Equula caballa. Bleeker, Oost-Java, (not C. V.)
Leiognathus splendens, Bleeker, Arou, 1873, p. 2.

B. v, D. $\frac{8}{16}$, P. 17, V. 1/5, A. $\frac{3}{14}$, C. 17, L. l. 55-60.

Length of head one-fourth, of caudal $4\frac{1}{4}$, height of body $2\frac{1}{4}$ to $2\frac{1}{3}$ in the total length. *Eyes*—diameter 1/3 of length of head, nearly 1 diameter from end of snout, and also apart. Dorsal profile much more convex than that of the abdomen. Snout obtuse. Interorbital cavity nearly twice as long as wide. A pair of fine spines at the anterior-superior angle of the orbit, and which are sometimes bifurcated, the distance between the bases of the outer orbital spines equals one-third of the length of the head. Supra-orbital edge rather coarsely serrated. The maxilla reaches to below the middle of the eye. Lower preopercular edge strongly serrated. Mandibles slightly concave. *Teeth*—in a single row in either jaw. *Fins*—dorsal spines strong, the second equals about 1/3 of the height of the body, the third is strongly serrated along the anterior edge of its lower third, the fourth and fifth are also serrated. Pectoral as long as the head excluding the snout. Ventral spine strong, the fin nearly reaches the base of the anal: second anal spine strong, equalling about 1/3 of the height of the body, the third serrated anteriorly along its lower third. Caudal deeply forked. *Scales*—distinct, in irregular rows, and extended over the breast and chest: a large one at base of ventral fin. *Lateral-line*—consisting of 60 or 70 short tubes, and does not quite reach the base of the caudal fin. *Colours*—silvery, with a deep black blotch in the upper half of the spinous dorsal: a black mark over snout: axilla dark, and the base of the pectoral black posteriorly.

It is termed *Kulli karé*, Tam., Jerdon, *l. c.*

Habitat.—Red Sea, seas of India to the Malay Archipelago; attaining at least 5 inches in length.

4. Equula daura, Plate LII, fig. 4.

Zeus dacer karah, Russell, Fish. Vizag. i, p. 51, pl. 65.
Equula daura, Cuv. Règ. Anim.; Cantor, Catal. p. 150; Jerdon, M. J. L. and Sc. 1851, p. 138; Günther, Catal. ii, p. 502; Day, Fish. Malabar, p. 105.
Equula dacer, Cuv. and Val. x, p. 83; Bleeker, Makr. p. 81.
Equula brevirostris, Bleeker, Batav. and Oost-Java (not Cuv. and Val.).

B. v, D. $\frac{8}{15-16}$, P. 20, V. 1/5, A. $\frac{3}{14}$, C. 17.

Length of head $4\frac{1}{2}$, of caudal $4\frac{1}{2}$, height of body $2\frac{2}{3}$ in the total length. *Eyes*—diameter 1/3 of length of head, 1 diameter from end of snout, and nearly 1 apart. Dorsal profile slightly more convex than that of the abdomen. Interorbital cavity a little more than twice as long as wide. A pair of very small spines at the anterior-superior angle of the orbit. Distance between the outer margins of orbital spines equals 2/5 of the length of the head. Orbital edge not serrated. The maxilla reaches to below the front edge of the eye. Mandibles slightly concave: lips thick. Lower preopercular margin finely serrated. *Teeth*—fine. *Fins*—dorsal spines of moderate strength, the second equal to nearly 1/2 the height of the body, the third is slightly serrated anteriorly near its base. Pectoral as long as the head excluding the snout. Ventral does not reach the anal. Anal spines comparatively weak, the second equals 3/10 of the height of the body, the third is serrated anteriorly in its lower third. Caudal forked. *Scales*—small but distinct, none on breast or chest: an elongated one at base of ventral. *Lateral-line*—in about 60 short tubes, placed on rounded plate-like scales; it does not extend on to the caudal fin. Free portion of the tail as long as high. *Colours*—silvery, with a golden stripe along the side. A dark line along the base of the dorsal: a darkish triangular spot between the occiput and dorsal fin: upper half of spinous dorsal black from the second to the fifth spines.

It is termed *Rama karé*, Tam., Jerdon, *l. c.*

Habitat.—Ceylon and Coromandel coast to the Malay Archipelago; attaining at least 5 inches in length. The specimen figured (life-size) is from Madras.

5. Equula bindus.

Zeus bindoo-karah, Russell, Fish. Vizag. i, p. 50, pl. 64.
Equula bindus, Cuv. and Val. x, p. 78; ? Cantor, Catal. p. 148; Jerdon, M. J. L. and Sc. 1851, p. 138.

B. iv, D. $\frac{8}{16}$, P. 15, V. 1/5, A. $\frac{3}{15}$.

Length of head $4\frac{1}{2}$, of caudal $4\frac{1}{4}$, height of body $2\frac{1}{3}$ in the total length. Abdominal profile more convex than the dorsal, which is rather concave over the orbits. *Fins*—second dorsal spine equal to about 1/3 of the height of the body. Ventrals short, scarcely reaching half way to the anal (Russell did not detect any spine in them.) Second anal spine weaker and a little shorter than the second dorsal one. *Colours*—silvery-olive over the nape, fins hyaline, the upper third of the spinous dorsal orange edged inferiorly with black.

Amongst Sir W. Elliot's figures of Indian Fishes, is one marked by Jerdon as belonging to this species, and its proportions and colours are very similar to *Equula bindoides*, Bleeker, Makr. p. 375 and p. 83; Günther, Catal. ii, p. 501; Kner, Novara Fische, p. 168.

Sir W. Elliot's fish is termed *Tatnam karé*, Tam. Unfortunately I have mislaid my specimens, so am unable to give a full description.

Habitat.—Coromandel coast.

6. Equula Blochii, Plate LII, fig. 5.

Zeus notatus, (Bloch, MSS.) Cuv. and Val.

Equula Blochii, Cuv. and Val. x, p. 84; Day, Fish. Malabar, p. 105.

B. v, D. $\frac{8}{16}$, P. 18, V. 1/5, A. $\frac{3}{14}$, C. 17.

Length of head $4\frac{1}{3}$, of caudal $4\frac{3}{4}$ to 5, height of body $2\frac{3}{4}$ to $3\frac{1}{4}$ in the total length. *Eyes*—diameter 1/3 of length of head, 1 diameter from end of snout, from 3/4 to 1 apart. Dorsal profile rather more convex than that of the abdomen, a slight concavity over the occiput, the snout is rather pointed and not truncated. Upper surface of orbit serrated, which serrations appear to become obsolete in some old specimens: a pair of small spines at its anterior-superior angle, the distance between the outer edges of the supraorbital spines equals 2/5 of the length of the head. The posterior margin of the maxilla reaches to below the first third or middle of the eye. Lower edge of preopercle strongly serrated. Cavity on upper surface of head at least twice as long as wide. *Teeth*—in a single row in the jaws. *Fins*—dorsal spines of moderate strength, the second rather the longest, and equal or nearly equal, to 1/2 the height of the body, the third and fourth serrated anteriorly in their lower halves. Pectoral as long as the head excluding the snout. Ventral reaches to the anal. Second anal spine $2\frac{1}{4}$ in the height of the body: the third finely serrated anteriorly. *Scales*—on body (except base of pectoral fin), breast, and chest: a rather large one at base of ventral. *Lateral-line*—in about 60 tubes, situated on rounded scales. *Colours*—silvery, with a dark brown blotch over the nape, and a black mark in the upper half of the spinous dorsal fin from the third to the sixth spines. Vertical zig-zag yellow lines on the back and sides, which fade soon after death: base of pectoral posteriorly dark coloured.

Habitat.—Seas of India, where it is common. I have it from Bombay, Malabar, Madras, Calcutta, and Akyab, and many young from the Sunderbunds. The specimen figured (life-size) is from Bombay.

7. Equula brevirostris.

Cuv. and Val. x, p. 84 (not Bleeker, Batav. and Oost Java).

B. v, D. $\frac{8}{16}$, P. 18, V. 1/5, A. $\frac{3}{14}$, C. 17.

Length of head $4\frac{1}{3}$, of caudal $4\frac{1}{3}$, height of body $2\frac{2}{3}$ in the total length. *Eyes*—diameter nearly $2\frac{3}{4}$ in length of head, 3/4 of a diameter from end of snout, and 1 apart. Body oval, dorsal and abdominal profiles equally convex: snout pointed, not obtuse except just at its anterior extremity. Interorbital cavity nearly twice as long as broad. A pair of well developed spines at the anterior-superior angle of the eye; supraorbital edge finely serrated. The distance from the external sides of the bases of the orbital spines equals 1/2 the length of the head. The maxilla reaches to below the first third of the eye: lower jaw very concave inferiorly. Lower limb of preopercle finely serrated. *Teeth*—in a single fine row in either jaw. *Fins*—dorsal spines moderately strong and compressed, the second equals 4/9 (sometimes 1/3) of the height of the body: the third is strongly serrated in its lower half, whilst the fourth is in its lower fourth. Pectoral as long as the head excluding the snout. Ventral reaches 2/3 of way to the anal. Second anal spine 2/5 of height of body, the third is strongly serrated in its lower half. Caudal forked. Free portion of tail as high at its base as it is long. *Scales*—extended over body, but not on breast or chest. *Lateral-line*—in from 58 to 64 distinct tubes, and not quite reaching to the base of the caudal fin. *Colours*—an oval black blotch on the upper half of the spinous dorsal fin, from the third to the seventh spines (it is sometimes very faint), and a dark brown transverse blotch across the nape of the neck. Pectoral posteriorly black at its base. A narrow yellow band passes from above the eye to the centre of the base of the caudal fin.

There are two Indian *Equula's* (? species) very similar, the one described above, *E. brevirostris*, which is destitute of scales on the breast and chest, but which is otherwise similar to the second or *E. Blochii.* The latter was described from a stuffed specimen still at Berlin, and they may prove to be varieties of the same species.

E. nuchalis, Tem. and Schleg. is very similar, but the dorsal and anal spines appear to be usually shorter, but this again is subject to considerable variation. Dr. Hubrecht at Leyden having kindly examined the type, observes that the breast and chest are apparently scaleless: still microscopic scales may perhaps exist partly hidden in the integument.

Habitat.—Seas of India to China: attaining at least $4\frac{1}{2}$ inches in length.

8. Equula lineolata, Plate LI, C. fig. 3.

Cuv. and Val. x, p. 86; Bleeker, Makr. p. 83; Günther, Catal. ii, p. 502.

B. v, D. $\frac{8}{16}$, P. 19, V. 1/5, A. $\frac{3}{14}$, C. 17.

Length of head $4\frac{1}{4}$, of caudal $4\frac{2}{3}$, height of body $2\frac{3}{4}$ in the total length. *Eyes*—diameter 1/3 of length of head, 3/4 of a diameter from end of snout, and 1 apart. Body of an oblong form, with the dorsal and abdominal profiles equally convex, a slight concavity over the occiput. Interorbital cavity at least twice as long as wide. A pair of minute spines over the anterior third of the orbit, and the distance between their outer margins equals $3\frac{1}{4}$ in the length of the head: supraorbital edge serrated or only a little rough to the feel. Maxilla reaches to below front third of the eye: inferior edge of mandible very slightly concave. Lower edge of preopercle minutely serrated. *Teeth*—fine and in a single row. *Fins*—dorsal spines weak, the second arched, and equal to 2 or $2\frac{1}{3}$ in the height of the body, the third and fourth anteriorly serrated in their lower halves. Pectoral as long as the head excluding the snout. Ventral does not quite reach the anal. Second anal spine arched,

1/3 to 2/5 of the height of the body, its third spine anteriorly serrated. Caudal forked. *Scales*—small but distinct, present on breast and chest. *Lateral-line*—becomes lost at nearly the end of the free portion of the tail: it consists of above 60 tubes placed on a row of plate-like, rounded scales. *Colours*—silvery, with vertical zigzag lines passing down the back: base of pectoral posteriorly black: upper edge of dorsal darkish.

Habitat.—Seas of India to the Malay Archipelago. The specimen figured (life-size) is from Madras.

9. **Equula insidiatrix**, Plate LI, C. fig. 5.

Zeus insidiator, Bloch, t. cxcii, f. 2, 3; Gmel. Linn. p. 1221; Bl. Schn. p. 95; Shaw, Zool. iv, p. 284, pl. 41; Lacép. iv, pp. 572, 574.

Equula insidiatrix, Cuv. and Val. x, p. 98; Cantor, Catal. p. 151; Bleeker, Makr. p. 84; Jerdon, M. J. L. and Sc. 1851, p. 138; Peters, Mon. Akad. Berlin, 1868, p. 262; Günther, Catal. ii, p. 504; Day, Fish. Malabar, p. 102.

Paarl coorchee, Mal.

B. v, D. $\frac{8-9}{16-17}$, P. 18, V. 1/5, A. $\frac{3}{14}$, C. 17.

Length of head from $4\frac{3}{4}$ to 5, of caudal 5, height of body from $2\frac{1}{3}$ to $2\frac{2}{3}$ in the total length. The young are much more elongated. *Eyes*—diameter $2\frac{1}{3}$ in length of head, 3/4 of a diameter from end of snout, and 3/4 to 1 apart. Abdominal profile more convex than the dorsal one. Premaxillaries very protractile, the length of their hind limb equalling 1/8 of that of the total length: and when fully protracted the mouth remains directed somewhat upwards, when closed the mandible is almost vertical and not concave. Interorbital cavity triangular. The middle third of the supraorbital edge finely serrated. One or two minute supraorbital spines at the anterior-superior edge of the orbit directed backwards, the external when two are present the stronger. The maxilla reaches to below the front third of the eye. Lower edge of preopercle minutely serrated, occasionally almost smooth. *Teeth*—minute, in 1 or 2 rows. *Fins*—dorsal spines weak, smooth: the first minute, the second, third, and fourth subequal in length and equal 1/3 the height of the body. Pectoral nearly as long as the head. Second anal spine equals the diameter of the orbit. Ventral minute, reaching 1/2 way to anal. Caudal forked. *Scales**—minute over the body, breast, and chest, but not at the base of the pectoral fin. *Lateral-line*—passes nearly level with the back and is generally lost near the tail, but sometimes as far forwards as below the middle or last third of the dorsal fin. *Colours*—back bluish-silver, abdomen whitish-silver, the whole being glossed over with a slightly golden tint. The upper surface of the head, cheeks, and lower jaw, all of burnished silver, often a black streak from the eye to the throat, joining that of the opposite side: a dark mark in the axilla. Three or four horizontal lines of black spots, with bronze reflections, form from eight to ten vertical bands descending along the upper half of the body. Spinous dorsal tipped with black: ventral white: pectoral light yellow: caudal yellowish, and stained at the end with brown.

Habitat.—Seas of India and the Malay Archipelago: it is said to be occasionally captured in fresh water.

10. **Equula ruconius**, Plate LI, C, fig. 4.

Chanda ruconius, Ham. Buch. Fish. Ganges, pp. 106, 371, pl. xii, f. 35.

Equula interrupta, Cuv. and Val. x, p. 102; Bleeker, Ich. Fauna Beng. 1853, p. 96, and Makr. p. 85; Günther, Catal. ii, p. 504; Peters, Monats. Ak. Berlin, 1868, p. 262; Kner, Novara Fische, p. 169.

Equula ruconius, Cuv. and Val. x, p. 79 (not Day, P. Z. S. 1869, p. 302).

B. v, D. $\frac{8}{16}$, P. 18, V. 1/5, A. $\frac{3}{14}$, C. 17.

Length of head $4\frac{1}{3}$, of caudal $4\frac{3}{4}$, height of body ($1\frac{1}{2}$ to $1\frac{2}{3}$ in the young) one half of the total length. *Eyes*—diameter 1/3 of length of head, 1 diameter from end of snout, and also apart. Abdominal profile much more convex than that of the abdomen, a concavity over the occiput. Premaxillaries very protractile, the length of their hind limbs equalling 1/12 of the total length, the mouth as in *E. insidiatrix.* Last half of supraorbital edge minutely serrated; one or two spines close to hind nostril. The maxilla reaches to below the front edge of the orbit. Lower edge of preopercle serrated, most coarsely so anteriorly. *Teeth*—in a single, minute, and deciduous row. *Fins*—second dorsal spine the longest, equal to 2/7 of the height of the body, the third serrated anteriorly in its lower third. Pectoral 3/4 the length of the head. Ventral reaches half way to anal, second anal spine equals the diameter of the orbit. Caudal forked. *Scales*—very deciduous, apparently often absent and usually so above the lateral-line, they are from two to three times the size of those in *E. insidiatrix*, and are often extended on to the chest. *Lateral-line*—in single tubes, usually ceasing below the middle of soft dorsal, but sometimes continued to its last third. *Colours*—back bluish-silvery, abdomen silvery-white. A well marked black streak from the anterior edge of the eye to the throat, joining that of the opposite side. A dark spot on the upper part of the opercle, back of the base of the pectoral black. Vertical lines of black marks having bronze reflections descend down the upper third of the body, and are often subdivided into spots. Spinous dorsal tipped with black.

This is much more frequently captured in estuaries and tidal rivers than *E. insidiatrix*, it is common in the Hooghly at Calcutta. *Chanda* (*ambassis*) *ruconius*, McClelland, C. J. N. H. ii, p. 586, has erroneously been referred to this species. His specimens came from the Punjab, where no *Equula* exists. It is doubtless an *Ambassis*, and probably the *A. ranga*, H. B.

* In a specimen from Akyab, only $1\frac{4}{5}$ inches long and 7/10 high, the lower edge of the preopercle is rather coarsely serrated, and there are no scales on the body.

Habitat.—Seas of India to the Malay Archipelago and beyond; the specimen figured (life-size) is from Madras.

11. Equula fasciata, Plate LI, C. fig. 2.

Zeus karah, Russell, Fish. Vizag. i, p. 51, pl. 66.
Clupea fasciata, Lacép. v, p. 463.
Equula filigera, *longispinis* and *carah*, Cuv. and Val. x, pp. 92, 94, 95, pl. 284.
Equula fasciata, Cuv. and Val. x, p. 96; Günther, Catal. ii, p. 498; Day, Fish. Malabar, p. 106; Kner, Novara Fische, p. 167; Klunz. Verh. z. b. Ges. Wien, 1871, p. 467.
Equula filigera, Cuv. Mém. Mus. i, p. 402, pl. 23, f. 1; Swainson, Fishes, ii, p. 250; Cantor, Catal. p. 150; Bleeker, Makr. p. 79; Jerdon, M. J. L. and Sc. 1851, p. 138.
Equula setigera, Agass. Poiss. Foss. v, p. 24, t. B.
Leiognathus fasciatus, Bleeker, Bintang, 1868, p. 5.

B. v, D. $\frac{8}{16}$, P. 19, V. 1/5, A. $\frac{3}{14}$, C. 17, Cœc. pyl. (3).

Length of head 4 to four and a fourth, of caudal 4, height of body $2\frac{1}{2}$ in the total length. *Eyes*—diameter 1/3 of length of head, 3/4 to 1 diameter from end of snout, and nearly 1 apart. Dorsal profile rather more convex than the abdominal. A concavity over the occiput. Interorbital cavity nearly twice as long as wide, the posterior limb of premaxillary equals 2/3 of the length of the head. A pair of spines above the anterior-superior angle of the orbit. Orbital edge not serrated. The distance between the outer edges of the orbital spines equals $2\frac{2}{3}$ in the length of the head. The maxilla reaches to below the first third of the eye. Lower edge of preopercle nearly straight, and very finely serrated. Mandibula slightly concave inferiorly. *Teeth*—in a single row in the upper jaw: in villiform bands in the lower. *Fins*—dorsal spines of moderate strength, the second elongated, usually about 4/5 as high as the body, the third and fourth serrated anteriorly. Pectoral as long as the head excluding the snout. Ventral reaches 3/4 of the way to the anal. Second anal spine strong, equalling about 2/5 of the height of the body, but sometimes much longer. Caudal forked. Free portion of the tail about as high as long. *Scales*—cover body, absent or exceedingly indistinct on the chest. *Lateral-line*—consists of about 65 tubes, it ceases just before the base of the caudal fin. *Colours*—silvery, with irregular vertical streaks on the body.

Habitat.—Red Sea, seas of India to the Malay Archipelago and beyond.

12. Equula oblonga.

? *Scomber equula*, var. Forsk. p. 58.
Equula oblonga, Cuv. and Val. x, p. 85; Bleeker, Makr. p. 84; Günther, Catal. ii, p. 502; Day, Fish. Malabar, p. 106; Klunz. Verh. z. b. Ges. Wien, 1871, p. 467.
Equula berbis, Cuv. and Val. x, p. 85.

B. v, D. $\frac{8}{16-17}$, P. 16, V. 1/5, A. $\frac{3}{14-15}$, C. 16.

Length of head 4 to $4\frac{1}{3}$, of caudal $5\frac{1}{3}$, height of body $3\frac{1}{2}$ to 4 in the total length. *Eyes*—diameter 1/3 of length of head, 1 diameter from end of snout, and 1 apart. Abdominal profile rather more convex than that of the back. Snout rather pointed. Posterior limb of preopercle equal to $6\frac{1}{2}$ in the total length: an interorbital cavity much longer than wide. Orbital edge not serrated: two spines above the anterior edge of the eye: the distance between the outer edges of orbital spines equals half the length of the head. Lower preopercular edge finely serrated. Lower edge of mandible slightly concave. *Teeth*—in a single row in either jaw. *Fins*—dorsal spines moderately strong, the second equal to 2/3 the height of the body. Pectoral 4/7 of the length of the head. Ventral reaches 2/3 of way to anal, the second spine of which latter fin equals 1/2 the height of the body. Caudal forked. *Scales*—very minute, none on chest. *Colours*—grayish on the back, becoming silvery below: a silvery band along the side, irregular angular bands over the back to as low as the lateral-line. No black on the dorsal fin.

Habitat.—Red Sea, seas of India to Malay Archipelago and beyond.

Genus, 12—Gazza, *Rüpp.*

Equula, sp. Cuv. and Val.

Branchiostegals five: pseudobranchiæ. Body oblong, elevated, and compressed. Mouth very protractile. Lower preopercular margin serrated. Teeth, a pair of canines in the upper, a conical row in the lower jaw. A single dorsal fin, having less spines (8) *than rays* (16) *: anal with three spines continuous with the soft portion which has less rays* (14) *than the soft dorsal: no finlets. Lateral-line unarmed.*

These fishes were included by Cuv. and Val. with the *Equula* as one genus, Rüppell observing their strong teeth and the presence of canines, separated them, but Kner has again considered them as one genus.

Geographical distribution.—Red Sea, seas of India to the Malay Archipelago and beyond.

SYNOPSIS OF SPECIES.

1. *Gazza minuta.* Length of head $3\frac{3}{4}$, height of body $2\frac{1}{4}$ to $2\frac{1}{3}$ in the total length. Dorsal spines $2\frac{1}{3}$ in height of body. Silvery, axilla black. Seas of India to the Malay Archipelago and beyond.

2. *Gazza æquulæformis.* Length of head $3\frac{1}{2}$ to 4, height of body $2\frac{1}{3}$ to 3 in the total length. Dorsal spines 2 to $2\frac{1}{3}$ in height of body. Silvery, axilla usually brown or black: a silvery lateral streak in the young. Red Sea, seas of India to the Malay Archipelago.

1. Gazza minuta, Plate LIII, fig. 1.

Scomber minutus, Bl. t. 429, f. 2; Bl. Schn. p. 36.
Zeus komah-karah, Russell, Fish. Vizag. i, p. 50, pl. 63.
Equula coma et *minuta*, Cuv. and Val. x, pp. 76, 88; Jerdon, M. J. L. and Sc. 1851, p. 138.
Equula dentex, Cuv. and Val. x, p. 91; Kner, Novara Fische, p. 170.
Gazza minuta, Bleeker, Sumatra, p. 259, and Makr. p. 85; Günther, Catal. ii, p. 506.
Gar-chum, Belooch.

B. v, D. $\frac{8}{16}$, P. 17, V. 1/5, A. $\frac{3}{14}$, C. 19.

Length of head $3\frac{3}{4}$, of caudal $4\frac{2}{3}$ to 5, height of body $2\frac{1}{4}$ to $2\frac{1}{3}$ in the total length. *Eyes*—diameter $2\frac{2}{3}$ to $2\frac{3}{4}$ in length of head, 2/3 of a diameter from end of snout, and 3/4 apart. Dorsal profile from snout to base of fin ascending in an almost straight line. Supraorbital edge serrated, two spines above the anterior third of the eye. The maxilla reaches to below the first third of the eye. Lower edge of preopercle coarsely serrated, especially anteriorly. *Teeth*—a row of pointed ones in the premaxillaries, and two canines opposite the symphysis: villiform in the lower jaw, with an outer row of large conical ones, increasing in size with age. *Fins*—dorsal spines weak, the second and third of about the same height, and equalling $2\frac{1}{8}$ in that of the body. Pectoral as long as the head excluding the snout. Ventral reaches two-thirds of the way to the anal. Second anal spine from $2\frac{1}{3}$ to 3 in the height of the body. *Scales*—on body, but absent from or very inconspicuous on the chest. *Lateral-line*—on a row of plate-like scales and in about 60 tubes, it ceases either below the end of the dorsal or close to the base of the caudal fin. *Colours*—silvery, with irregular bluish or yellowish lines descending from the back to the lateral-line, the axilla black; anterior portion of the dorsal fin dark.

In external appearance *Zeus koma karah*, Russell=*Equula coma*, C.V. strongly resembles *E. edentula*, Bl. (see p. 238). It is termed *Kotoo kare*, Tam. Jerdon, *l. c.*

Habitat.—Seas of India to the Malay Archipelago and beyond: the specimen figured (6 inches long) is from the Andamans.

2. Gazza æquulæformis.

Rüpp. N. W. Fische, p. 4, t. i, f. 3; Bleeker, Sumatra, ii, p. 261; Cantor, Catal. p. 153; Günther, Catal. ii, p. 506; Klunz. Verh. z. b. Ges. Wien, 1871, p. 468.

B. v, D. $\frac{8}{16}$, P. 15, V. 1/5, A. $\frac{3}{14}$, C. 17.

Length of head $3\frac{1}{2}$ to 4, of caudal $4\frac{1}{3}$, height of body $2\frac{1}{3}$ to 3 in the total length. *Eyes*—diameter $2\frac{3}{4}$ in length of head, 3/4 of a diameter from end of snout, and 1 diameter apart. Dorsal and abdominal profiles about equally convex. Supraorbital edge serrated, sometimes coarsely so (in one specimen it only feels rough to the touch), two spines above the front third of the eye, the distance between the outer edges of the spines on either side of the orbit equals 2/5 of the length of the head. The length of the hind limb of the premaxillary equals $5\frac{1}{3}$ in the total length. The maxilla reaches to below the anterior 1/3 of the eye. Inferior surface of mandible scarcely concave. Lower margin of preopercle rather strongly serrated. *Teeth*—in a row of pointed ones in the upper jaw, having two canines in the median line: villiform in the lower jaw, with an outer row of curved and pointed ones, which increase in size anteriorly, becoming like canines on either side of the symphysis. *Fins*—dorsal spines weak, second and third of about the same length, and equal to from 2 to $2\frac{1}{3}$ in the height of the body. Pectoral as long as the head behind the middle of the eye. Ventral reaches 2/3 of the way to the anal. Second anal spine stronger than those of the dorsal, and equal to about 1/3 of the height of the body, the third rough anteriorly in its lower third. Caudal forked. *Scales*—over body, none on breast and chest. *Lateral-line*—in single tubes, ceasing opposite the last third of the soft dorsal. *Colours*—grayish along the back, silvery on the sides and beneath, zigzag irregular bluish bands descend from the back to as low as the lateral-line. Spinous dorsal fin with brown spots, especially between the second and third spines: axilla usually brown or black. The young have a silvery band along the sides.

Habitat.—Red Sea, seas of India to the Malay Archipelago: attaining at least 6 inches in length. It is very common along all the coasts of India as far as Sind.

Genus, 13—Lactarius, *Cuv. and Val.*

Branchiostegals seven: pseudobranchiæ. Body oblong, compressed. Eyes lateral. Cleft of mouth deep, with the lower jaw prominent. Preopercular margins entire. Teeth in jaws small, with one or two pairs of strong canines. Two dorsal fins, the first with seven or eight feeble spines, second and the anal with many rays, but no finlets: anal with three spines joined to the remainder of the fin. Scales cycloid, of moderate size, some over the second dorsal and anal fins. Lateral-line continuous, unarmed. Air-vessel bifurcated both anteriorly and posteriorly. Pyloric appendages few.

Lactarius, as observed by Günther (Catal. ii, p. 507), "approaches the family of *Sciænidæ*, and especially the Genus *Otolithus*, by several characters, namely, by the structure of the mouth, and by the air-bladder, by the muciferous cavities of the skull, and by the anal spines, which are continuous with the soft fin."

Geographical distribution.—Seas of India to the Malay Archipelago.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Lactarius delicatulus*, D. 7-8 | $\frac{1}{21-22}$, A. $\frac{3}{25-28}$, L. l. 74-80. A black spot at the upper and posterior part of the opercle. A dark band sometimes present along the soft dorsal and anal fins. Seas of India to the Malay Archipelago.

1. Lactarius delicatulus, Plate LIII, fig. 2.

Scomber lactarius, Bl. Schn. p. 31.

Sparus chundawah, Russell, Fish. Vizag. ii, p. 6, pl. 108.

Lactarius delicatulus, Cuv. and Val. ix, p. 238, pl. 261; Cantor, Catal. p. 138; Günther, Catal. ii, p. 507; Day, Malabar Fishes, p. 107.

Purruwah, Mal.; *Sudumu*, Telugu (Gopaulpore).

B. vii, D. 7-8 | $\frac{1}{21-22}$, P. 17, V. $\frac{1}{5}$, A. $\frac{3}{25-28}$, C. 17, L. l. 74-80, Cæc. pyl. 6.

Length of head 1/4, of caudal 2/9 to 1/4, height of body 2/7 of the total length. *Eyes*—diameter 1/3 of length of head, 1/2 to 2/3 of a diameter from end of snout, 4/5 of a diameter apart. Profile with a gradual rise to the first dorsal. The end of the lower jaw, when the mouth is closed, appears on the upper profile. Mouth oblique and large: the upper jaw extending to below the centre of the orbit. Preorbital narrower than the maxillary: preopercle narrow, with its margin entire and angle rounded. Opercle ending in a soft point. Interorbital space convex. Occipital crest well developed, the lateral ridges moderately so. *Teeth*—a curved canine on each side of the symphysis of the upper jaw, and laterally a single series of fine ones: a central canine (occasionally two) in lower jaw, and laterally a single row of curved teeth. Teeth on vomer, palatines, and tongue. *Fins*—first dorsal spine weak, the third the longest: membrane rather deeply notched. Second dorsal highest anteriorly, where it nearly equals the first dorsal, and is about 1/2 the height of the body. Anal similar to the second dorsal. In many specimens taken in Malabar, the fin rays were invariably A. 3/26, but amongst several taken in Madras they were in all instances A. 3/28. Caudal rather deeply lobed. *Scales*—cycloid, small, and deciduous. *Lateral-line*—in short single tubes. *Colours*—the upper surface of the head and the back as low as the lateral-line of a leaden colour: a black spot exists on the upper and posterior part of opercle. Fins diaphanous, marginal halves of dorsals and caudal minutely dotted with black, sometimes the base is also dark. Iris silvery, upper portion darkish.

Habitat.—Seas of India, Malay Archipelago, and China. Grows to at least 10 inches in length, is eaten by the natives either fresh or salted, but is insipid. It appears in Malabar in shoals during the months of February and March, but a few are present throughout the year.

Family, XVII—STROMATEIDÆ.

Stromateinæ, Swainson.

Branchiostegals from five to seven: pseudobranchiæ. Body oblong or slightly elongated and compressed Gill-openings wide. Eyes lateral. The infraorbital bones do not articulate with the preopercle. Small teeth in the jaws, palate edentulous: barbed teeth extend into the œsophagus. One long dorsal fin without any distinct spinous division, or with rudimentary spines anteriorly: ventrals, when present, thoracic. No prominent papilla near the vent. Air-vessel, when present, small. Pyloric appendages few, in moderate numbers, or numerous. Vertebræ exceed 10-14.

Geographical distribution.—Found in most tropical and temperate seas.

SYNOPSIS IN INDIVIDUAL GENUS.

Genus, 1—Stromateus, *Artedi.*

Peprilus, Cuv.: *Apolectus*, Cuv. and Val. (young having ventral fins): *Rhombus* (ventrals reduced to a spine), (Lacép.) Cuv. and Val.: *Seserinus* (with minute ventrals), Cuv. and Val.: *Stromateoides*, Bleeker: *Chondroplites* and *Porouotus*, Gill.

Branchiostegals from five to seven: pseudobranchiæ. Body compressed, more or less elevated. Cleft of mouth narrow or of moderate depth. Teeth small, in a single row in the jaws: palate and tongue edentulous: œsophagus armed with numerous barbed teeth. A single long dorsal and anal fin, having rudimentary spines anteriorly: ventral fins not present in the adult stage. Scales small, covering the vertical fins. Lateral-line, as a rule, smooth (keeled in S. niger). Air-vessel absent. Pyloric appendages numerous.

After examining very numerous specimens of fish of this genus in the fish markets of India, I could not resist the belief that reduced as the number of species had been from what were formerly recognized, a still further reduction might still be necessary. I have been unable to convince myself of more than three distinct species, which may be recognised in the fry and immature by the following characters.

SYNOPSIS OF SPECIES.

1. *Stromateus Sinensis*, D. 43-50, A. 39-42. Caudal lobes of about equal length. No free spines before dorsal or anal fins. Seas of India to China.

2. *Stromateus cinereus*, D. 5-9 | $\frac{1}{38-43}$, A. 5-6 | $\frac{1}{32-41}$. Lower caudal lobe much the longer. Free, truncated, spines before both dorsal and anal fins. Seas of India to China.

3. *Stromateus niger*, D. $\frac{5}{42-44}$, A. $\frac{3}{35-39}$. Ventral fins present in the young. Last portion of lateral-line keeled. Deep brown colour. Seas of India to China.

1. Stromateus Sinensis, Plate LI, C. fig. 6 (*young*).

Euphrasin, Vetensk. Acad. Nya Handl. Stockh. ix, p. 49, t. ix; Bl. Schn. p. 492; Cantor, Catal. p. 140; Day, Fish. Malabar, p. 76.

Stromateus atoo koia, Russell, Fish. Vizag. i, p. 33, pl. 44.

Stromateus atous, Cuv. and Val. ix, p. 389; Richards. Ich. China, p. 273; Jerdon, M. J. L. and Sc. 1851, p. 137; Günther, Catal. ii, p. 399.

Stromateus albus, Cuv. and Val. ix, p. 388; Cantor, Ann. and Mag. ix, p. 15.

Stromateus candidus, Bleeker, Ich. M. O. Java, p. 9 (not Cuv. and Val.).

Stromateoides atookoia, Bleeker, Makr. p. 369, and Makr. p. 76.

Vella arwoolee, Mal.; *Mogany voval*, Tam.; *White pomfret.*

B. vi, D. 43-50, P. 25, A. 39-42, C. 19.

Length of head $4\frac{1}{3}$ to 5, of pectoral $3\frac{1}{2}$ to 4, of caudal $4\frac{1}{3}$ to 5, height of body $1\frac{2}{3}$ to $1\frac{1}{2}$ in the total length. *Eyes*—diameter $3\frac{1}{2}$ to $4\frac{1}{4}$ in length of head, 2/3 to 1 diameter from end of snout, and $1\frac{2}{3}$ apart. Dorsal and abdominal profiles about equally convex. The lower jaw the longer, especially in young specimens: the maxilla reaches to beneath the first third of the eye. *Teeth*—in a fine single row in each jaw, becoming lost with age. *Fins*—first four or five dorsal rays very short, and not appearing above the skin, its anterior portion is similar to that of the anal and equals the length of the pectoral fin. First five anal rays short but not appearing above the skin. Caudal with equal lobes, in the young it is slightly emarginate. Even in the young there is no trace of any ventral fins. *Scales*—small and very deciduous, especially in the immature, in the adult they cover the vertical fins. *Colours*—upper surface of head and body as far as the lateral-line of a deep neutral-tint, the rest of the body with a mixture of brownish-gray, having metallic reflections, becoming lighter and silvery towards the abdomen: it is dotted all over with brown, the larger spots having a silvery point in their centre. Fins silvery-gray, marginal half blackish. Cavity of the mouth and tongue pale bluish-gray with brown dots, silvery in the centre. Iris reddish-silver or copper coloured, minutely dotted with brown. The *young* are gray, the head covered with irregularly star-shaped spots, and the fins nearly black, especially at their edges.

Jerdon observes, *l. c.*, "this is by far the finest eating of all the genus." Russell, however, says, "though alike in colour, this fish is very different from the *Stromateus cinereus* of Bloch; which is specifically characterized by the length of the lower lobe of the caudal fin," (p. 34.)

Habitat.—Seas of India, Malay Archipelago, and China. This species of Pomfret is that most esteemed for eating: in Malabar it is by no means rare during the S. W. monsoon (from June till September.) It

should be cooked when quite fresh. The young are common round the coasts and ascend estuaries. I found them numerous during March in the Sunderbunds. The one figured (life-size) is from Bombay. Russell's figure of the adult is a very good representation of the fish.

2. Stromateus cinereus, Plate LIII, fig. 3.

Bloch, xii, p. 90, t. ccccxx. (*semi-adult*) ; Cantor, Catal. p. 143 ; Günther, Catal. ii, p. 400 ; Day, Fish. Malabar, p. 78 *(immature)*.

Stromateus argenteus, Bloch, xii, p. 92, t. ccccxxi ; Russell, Fish. Vizag. i, p. 35 ; Cuv. and Val. ix, p. 393 ; Cantor, Catal. p. 142 ; Günther, Catal. ii, p. 400 ; Day, Fish. Malabar, p. 77 (*adult*).

Stromateus sudi sandawah, Russell, Fish. Vizag. i, p. 34, pl. 45 (*immature*).

Stromateus tella sandawah, Russell, l. c. i, p. 31 ; pl. 42 (*adult*).

Stromateus candidus, Cuv. and Val. ix, p. 391 ; Jerdon, M. J. L. and Sc. 1851, p. 137.

Stromateus securifer, Cuv. and Val. ix, p. 394, pl. 273 (*immature*).

Stromateus griseus, Cuv. and Val. ix, p. 395 ; Jerdon, l. c. p. 138.

Stromateoides cinereus, Bleeker, Makr. p. 368.

Vella voval, Tam. ; *Silver-pomfret* (*immature*) ; *Gray-pomfret*, (*adult*).

B. vii, D. 5-9 | $\frac{1}{38-43}$, P. 27, A. 5-6 | $\frac{1}{32-41}$, C. 19.

Length of head 4 to $4\frac{1}{2}$, of pectoral $2\frac{1}{3}$ to $2\frac{2}{3}$, height of body $1\frac{1}{3}$ to $1\frac{2}{3}$ in the total length excluding the caudal fin. *Eyes*—diameter 1/4 to 1/5 of length of head, 1 diameter from end of snout, and $1\frac{1}{2}$ to 2 apart. Snout projecting over the mouth : the maxilla reaches to below the first third of the orbit. *Teeth*—in a single row in either jaw. *Fins*—the dorsal spines appear in a truncated form above the skin, as do also those of the anal : anterior portion of soft dorsal elevated, but not to so great an extent as the anterior part of the anal which in the immature reaches to below the middle of the caudal fin, but as age advances it gradually becomes shortened. Pectoral rather pointed. Caudal deeply forked, the lower lobe much the longer in the immature, sometimes being twice as long as the upper. *Scales*—small and very deciduous. *Colours*—upper surface of head and back as low as the lateral-line of a grayish neutral-tint with purplish reflections, sides of head and body silvery-gray, fading to white on the abdomen, and everywhere covered with minute black dots : a dark spot on upper portion of the opercle. Dorsal and anal gray minutely dotted with black, the outer half being the darker. Caudal and pectoral yellowish-white, also minutely dotted with black, the outer half being the darker. Iris silvery. The *young* are much darker, the vertical fins being nearly black.

The occiput in the adult of this species is striated almost horizontally as shown in Russell's figure, but the commencement of these furrows is apparent in the immature.

The larger specimens (Gray-pomfrets) are considered superior to the immature (silver-pomfrets) for eating.

Habitat.—Seas of India to the Malay Archipelago and beyond, attaining at least a foot in length. The specimen figured is a little over 7 inches long.

3. Stromateus niger, Plate LIII, fig. 4.

? *Stromateus paru*, Linn. Syst. Nat. xii, I, p. 432 ; Bloch, v, p. 75, (*Stromateus fiatola*), t. 160 ; Bl. Schn. p. 491 ; Lacép. ii, p. 319 ; Shaw, Zool. iv, p. 108.

Stromateus niger, Bloch, t. 422 ; Bl. Schn. p. 492, t. xciii ; Shaw, Zool. iv, p. 111 ; Cuv. and Val. ix, p. 385 ; Cantor, Ann. and Mag. ix, p. 15, and Catal. p. 139 ; Richards. Ich. China, p. 272 ; Bleeker, Makr. p. 370, and Makr. p. 77 ; Jerdon, M. J. L. and Sc. 1851, p. 138 ; Günther, Catal. ii, p. 401 ; Day, Fish. Malabar, p. 79.

Stromateus nala sundawah, Russell, Fish. Vizag. i, p. 32, pl. 43.

Apolectus stromateus, Cuv. and Val. viii, p. 439, pl. 238 (*immature*) ; Cantor, Catal. p. 123.

Nala-sanda-wah, Tel. ; *Baal*, Ooriah ; *Curroopoo-voval*, Tam. ; *Kar-arwoolee*, Mal. ; *Ko-lig-dah*, And.

B. vii, D. $\frac{5}{42-44}$, P. 22, A. $\frac{3}{35-39}$, C. 19.

Length of head 2/9, of caudal 1/4, height of body 3/7 to 3 in total length. *Eyes*—diameter $4\frac{1}{4}$ to 5 in length of head, $1\frac{1}{4}$ diameters from end of snout, and nearly 2 apart. Dorsal and abdominal profiles equally angular. The lower jaw the longer : the maxilla extends to beneath the anterior margin to the orbit. *Teeth*—in a fine single series in both jaws. *Fins*—the dorsal and anal are much elevated anteriorly, very low posteriorly, with concave external margins. Pectoral 1/2 longer than the head, and falciform : ventrals only apparent in the young, in a specimen $3\frac{3}{10}$ inches in length they are jugular, and equal 1/8 of the total length. The spines, before the dorsal and anal fins, which are concealed in the adult fish, are apparent in the young specimens. *Scales*—small, and extended over the vertical fins. *Lateral-line*—gently curves downwards, and in its last fourth passes straight to the centre of the caudal, in the form of a raised keeled line with lateral shields as perceived in the genus *Caranx*. *Colours*—deep brown or grayish-brown with blue reflections : cheeks, opercles, and abdomen pale-neutral or brownish-neutral. Dorsal and anal grayish-brown, stained black towards their margins : pectoral and caudal brownish, edged with black. Iris brownish-blue : in the young it is gray. The dorsal and anal fins black, and the tail yellow, with three brown cross bands.

Habitat.—Seas of India to the Malay Archipelago and China. Grows to two feet in length, is excellent eating. John observes that the people of Tranquebar dislike it, because a species of parasite similar to a wood-louse is often found in its mouth. It appears in Malabar about the same time as the *S. Sinensis*. It comes in shoals, and disappears as suddenly as it arrives. The specimen figured is from Madras and about 15 inches long.

Family, XVIII—CORYPHÆNIDÆ, (pt.) *Swainson.*

Branchiostegals from five to seven: pseudobranchiæ present or absent. Body oblong or elevated and compressed. Gill-openings wide. Eyes lateral. The infraorbital bones do not articulate with preopercle. Teeth in the jaws, present or absent on the palate, none in the æsophagus. One long dorsal fin, without distinct spinous division: ventrals thoracic, (except in *Pteraclis,* when they are jugular). No prominent papilla near the vent. Air-vessel present or absent. Pyloric appendages few or many. Vertebræ exceed 10/40.

SYNOPSIS OF GENERA.

1. *Coryphæna.* Dorsal fin commencing on occiput: scales present.
2. *Mene.* Dorsal fin commencing on the back: scales absent.

Genus, 1—Coryphæna, *Cuv. and Val.*

Lampugus (immature), Cuv. and Val. Dolphins.

Branchiostegals seven: pseudobranchiæ absent. Body rather elongated and compressed. Preopercle entire. Teeth in the jaws, on vomer, palatines, and tongue. A single long dorsal fin extending from the occiput nearly to the caudal, but without distinct spines, neither are they apparent in the anal: ventral thoracic and well developed. Scales small, cycloid. Air-vessel absent. Pyloric appendages numerous.

Geographical distribution.—Seas of temperate and tropical regions.

Cuvier remarks upon the relative height of the crest on the neck, and suggests the possibility of its being partly due to sex. Günther considers "that the crest and the anterior part of the dorsal fin become gradually higher with age," Catal. ii, p. 405.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Coryphæna hippurus,* D. 58-63, A. 25-27. Gray, becoming golden on the sides and beneath, and covered with small blue spots. Seas of tropical and temperate regions.

1. Coryphæna hippurus, Plate LIII, fig. 6.

Linn. Syst. p. 446. Bloch, t. 174; Bl. Schn. p. 295; Lacép. iii, pp. 173, 178; Shaw, Zool. iv, p. 212, pl. 32, f. 1; Cuv. and Val. ix, p. 278, pl. 266; Guichen, Explor. Sc. Algér. Poiss. p. 63; Lowe, Trans. Zool. Soc. ii, p. 183, iii, p. 6, and Proc. Z. S. 1839, p. 80; Günther, Catal. ii, p. 406; Steind. Sitz. Ak. Wiss. 1868, p. 370; Klunz. Verh. z. b. Ges. Wien, 1871, p. 446.

Coryphæna chrysurus, Lacép. ii, pl. 18, f. 2; Cuv. and Val. ix, p. 309.
Coryphæna dorado, Cuv. and Val. ix, p. 303; Cuv. Règ. An. Ill. Poiss. pl. 65, f. 1.
Coryphæna dolfyn, virgata, and *argyrurus,* Cuv. and Val. ix, pp. 305, 308, 314.
Lampugus pelagica and *? immaculatus,* Cuv. and Val. ix, pp. 318, 329 *(immature).*
Coryphæna Japonica, Schleg. Fauna Japon. Poiss. p. 120, pl. 64.
Badahlan, Tam.: *Dolphin.*

B. vii, D. 58-63, P. 21, V. 1/5, A. 25-27, C. 19.

Length of head $5\frac{1}{6}$ to 6, of caudal $4\frac{1}{3}$ to $4\frac{1}{2}$, height of body $5\frac{1}{2}$ to $6\frac{1}{2}$ in the total length. *Eyes*—diameter 1/4 to 1/6 of length of head, 3 diameters from end of snout, and $1\frac{1}{2}$ apart. Body elongated and compressed: occipital crest well developed. Cleft of mouth rather oblique, the lower jaw the longer, the maxilla extends to below the middle or last third of the orbit. Opercles and shoulder bones striated but entire. *Teeth*—in numerous villiform rows in either jaw, with an outer somewhat enlarged one: they are also present on the vomer, palatines, and tongue. *Fins*—dorsal commences over the posterior edge of the orbit, its first seven or eight rays gradually increase in length, whilst the last in the fin is not quite 1/3 that of the highest, the fin reaches to a short distance anterior to the root of the caudal. Pectoral falcated: the anal commences midway between the anterior margin of the orbit and the base of the caudal fin, it is highest in front, but after the third or fourth rays it becomes parallel with the abdomen: caudal with deeply pointed lobes. *Lateral-line*—curved to opposite the end of the pectoral from whence it goes straight to the centre of the caudal. *Colours*—back grayish, shot with gold: abdomen golden, covered with blue spots, which become black after death: dorsal fin light blue at the base, becoming black towards the summit.

February 22nd, 1867, I found in the stomach of one of these fishes a *Clupea Neohowii* and the anterior half of an *Elops machnata.*

Habitat.—Seas of India, Malay Archipelago, &c.; the one figured (34 inches long) is from Madras: it attains 5 feet or more in length. These dolphins are not uncommon in Madras, and are eaten by the natives.

Genus, 2—MENE, *Lacép.*

Branchiostegals seven. Body oval, strongly compressed, with a prominent and sharp-edged abdomen. Mouth very protractile. Villiform teeth in the jaws, palate edentulous. A single long dorsal fin, without any distinct spinous portion, commencing on the back and extending nearly to the caudal: anal spineless, having many rays which are enveloped in skin and have very broad free extremities: ventral thoracic, with one spine and five rays, the first of which is very elongate. Scales absent. Air-vessel large and bifurcated posteriorly. Pyloric appendages numerous.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Mene maculata*, D. $\frac{3-4}{40-43}$, A. 30-33. Two rows of the blue spots along the back. Seas of India, to the Malay Archipelago and beyond.

1. Mene maculata, Plate LIII, fig. 5.

Zeus maculatus, Bl. Schn. p. 95, pl. 22.
Mene anna carolina, Lacép. v, pp. 479, 480, pl. xiv, f. 2.
Zeus ambata kuttee, Russell, Fish. Vizag. i, p. 47, pl. 60.
Mene maculata, Cuv. and Val. x, p. 104, pl. 285; Temm. and Schleg. Fauna Japon. Poiss. p. 127, p. 67, f. 3; Richards. Ich. China, p. 276; Cantor, Catal. p. 154; Bleeker, Makr. p. 86; Cuv. Règ. Anim. Ill. Poiss. pl. 62, t. 2; Jerdon, M. J. L. and Sc. 1851, p. 138; Günther, Catal. ii, p. 415.
Ambutan parah, Tam.

B. vii, D. $\frac{3-4}{40-43}$, P. 15, V. 1/5, A. 30-33, C. 18, Cæc. pyl. 25-30.

Length of head 4, of caudal 4, height of body $1\frac{3}{4}$ to 2 in the total length. *Eyes*—diameter 2/7 to 1/3 of length of head, 4/5 of a diameter apart, and 1 to $1\frac{1}{3}$ from end of snout. Body ovoid, highest anteriorly. Dorsal profile nearly horizontal, the abdominal very abruptly descending to the base of the ventral fin, from whence it gently curves so far as the commencement of the caudal. Mouth oblique, the lower jaw being anterior, cleft twice as long as the gape: anterior portion of the upper jaw formed by the premaxillaries, the maxilla smooth and S-shaped extends to below the anterior edge of the orbit. Opercles entire. Occipital crest high. *Teeth*—in villiform rows in the jaws. *Fins*—dorsal highest anteriorly, its first few rays undivided and more elevated than the remainder. Pectoral as long as the head excluding the snout, rays flat: ventral spine short, its first ray compressed and very long. Anal rudimentary, its rays forming short, wide, and flat processes: caudal deeply lobed. *Lateral-line*—sometimes ceases below the end of the dorsal fin, or on reaching the upper caudal lobe it may divide into two branches, the lower of which descends. *Colours*—deep blue along the back, becoming silvery white on the sides and abdomen: from two to three rows of large spots along the superior half of the body above the level of the pectoral fin.

This fish is termed "*Amatti katti*," Tam. *i. e.* "*rasor*," Jerdon, *l. c.*

Habitat.—Seas of India to the Malay Archipelago and beyond: attaining at least $8\frac{1}{2}$ inches in length.

Family, XIX—SCOMBRIDÆ, *Cuv.*

Branchiostegals seven or eight: pseudobranchiæ. Body oblong or slightly elongated and compressed. Gill-openings wide: eyes lateral. The infraorbital bones do not articulate with the preopercle. Teeth present in the jaws, absent or present on the palate. Two dorsal fins, the first being distinct from the soft, which has more rays than the first has spines: finlets present or absent: ventrals thoracic (jugular in *Hypsiptera*): no prominent papilla near the vent. Side of tail sometimes keeled. Scales, if present, small. Air-vessel present or absent. Pyloric appendages moderate, numerous, or dendritical. Vertebræ exceed 10/14.

SYNOPSIS OF GENERA.

1. *Scomber.* Teeth small, present in jaws. Five or six finlets: a low ridge on either side of base of tail. Body equally scaled. Red Sea, through those of India to the Malay Archipelago and beyond, also in most temperate and tropical seas.

2. *Thynnus.* Teeth small, present in jaws, vomer, and palate. Six to nine finlets: a central keel along either side of free portion of tail. Scales in the anterior region of the body forming a corselet. Red Sea, through those of India to the Malay Archipelago; also in most open temperate and tropical seas.

3. *Cybium.* Teeth large in jaws, small on vomer and palate. Seven to ten finlets: a central keel along either side of free portion of tail. Scales when present rudimentary. Red Sea, seas of India to the Malay Archipelago; also in the Atlantic.

4. *Elacate.** No finlets. First dorsal fin as free spines. A low keel along either side of free portion of the tail. Red Sea, seas of India to the Malay Archipelago; also in tropical parts of the Atlantic.

5. *Echeneis.*† No finlets. First dorsal in the form of a sucking disk on the summit of the head. No keel on side of tail. Found in most seas.

Genus, 1—Scomber, *Artedi.*

Branchiostegals seven: pseudobranchiæ. Body rather elongated and compressed. Eyes with adipose lids. Cleft of mouth deep. Small deciduous teeth on the jaws; deciduous ones present or absent on the vomer, and palatine bones. Two dorsal fins, the first spinous and separated by an interspace from the second, behind which and also posterior to the anal are five or six finlets: less spines in the first dorsal than there are rays in the second dorsal or in the anal: ventrals thoracic. Two slight keels on either side of the root of the caudal fin. Scales small. Air-vessel, when present, simple. Pyloric appendages numerous.

Although the young of the *Cybium*, *Elacate*, &c. are common all along the coasts of India, I have never obtained the fry of any species of *Scomber*. Sars has observed that the Mackerel deposits its ova in the open sea, where it floats near the surface (see Ann. and Mag. Nat. Hist. 1868, ii, p. 390).

Geographical distribution.—Red Sea, seas of India to the Malay Archipelago and beyond; also in most temperate and tropical seas.

SYNOPSIS OF SPECIES.

1. *Scomber microlepidotus*, D. 10 | $\frac{1}{11}$ + v-vi, A. $\frac{1}{11}$ + v-vi. Length of head $3\frac{3}{4}$ to $4\frac{1}{4}$, height of body 4 to $4\frac{2}{3}$ in the total length. A black spot covered by the pectoral fin in the young, bands along the back and sides in the adult. Red Sea, through those of India to the Malay Archipelago.

2. *Scomber brachysoma*, D. 10 | $\frac{1}{11}$ + v, A. $\frac{1}{11}$ + v. Length of head $3\frac{3}{4}$, height of body $3\frac{2}{3}$ in the total length. Andamans to the Malay Archipelago.

1. Scomber microlepidotus, Plate LIV, fig. 3 *(young)*, 4 *(immature)*, and 5 *(adult)*.

Rüpp. N. W. Fische, p. 38, t. xi, f. 2; Cantor, Catal. p. 105; Günther, Catal. ii, p. 361; Kner, Novara Fische, p. 143; Steind. Ak. Wiss. Wien, 1868, lvii, p. 987; Klunz. Verh. z. b. Ges. Wien, 1871, p. 443.

Scomber kanagurta, Russell, Fish. Vizag. ii, p. 28, pl. 136; Rüpp. Atl. Fische, p. 93, and N. W. Fische, p. 37; Cuv. and Val. viii, p. 49; Cuv. Règ. Anim.; Bleeker, Makr. p. 35; Peters. Weigm. Arch. 1855, p. 245; Jerdon, M. J. L. and Sc. 1851, p. 135; Günther, Catal. ii, p. 360; Day, Fish. Malabar, p. 68; Kner, Novara Fische, p. 142; Klunz. Verh. z. b. Ges. Wien, 1871, p. 441.

Scomber chrysozonus, Rüpp. N. W. Fische, t. xi, f. 1; Günther, Catal. ii, p. 360.

Scomber Reani, Day, Proc. Z. S. 1870, p. 690 *(adult)*.

Karna-kita or *Karnang-kullutan*, Tam.: *Kanagurta*, Tel.: *Ila*, Mal.: *Nga-congree*, "Large head," Mugh.: *Look-wa-dah*, Andam.

* A portion of Fam. Lichoidei, Bleeker (see note, page 229).

† Forming a distinct Family, Echeneoidei, Bleeker.

B. vi, D. 8-10 | $\frac{1}{11}$ + v-vi, P. 21, V. 1/5, A. $\frac{1}{11}$ + v-vi, C. 24, L. l. 130 to 150, L. tr. 10/28, Vert. 13/16.

Length of head $3\frac{3}{4}$ to $4\frac{1}{4}$, of caudal $4\frac{3}{4}$ to 5, height of body 4 to $4\frac{2}{3}$ in the total length. *Eye*—with a broad anterior and posterior adipose lid extending 1/3 across the eye. Diameter of eye 4 to $4\frac{1}{2}$ in length of head, 1 to $1\frac{1}{4}$ diameters from end of snout, and also apart. Lower jaw slightly the longer, cleft of mouth deep, the maxilla reaches to below the hind edge of the eye. Length of preorbital 1/2 that of the head, its greatest depth equals half the diameter of the eye. Interorbital space flat. *Teeth*—minute* in both jaws, none on vomer or palate. *Fins*—dorsal spines weak and receivable into a groove, the second to the eighth subequal and about 1/2 the height of the body, posteriorly they rapidly decrease in length. The distance between the two dorsal fins equals half the length of the base of the latter, the upper edge of which last is concave. Finlets commence just behind the fin and are opposite to and similar to those behind the anal. Pectoral short, nearly equalling half the length of the head. Caudal with deeply pointed lobes. *Scales*—smaller above than below the lateral-line, and largest just beneath the pectoral fin: the first few rows beneath the lateral-line are parallel with it, those below the pectoral are irregularly concave. Minute scales on second dorsal and anal fins. *Lateral-line*—very slightly curved. *Air-vessel*—present. *Pseudobranchiæ*—largely developed. *Colours*—back greenish, sides and abdomen iridescent, a row of sixteen spots along the summit of the back, close to the base of the dorsal fin: summit of head spotted: sides shot with bluish-purple. Dorsal fins yellowish, tipped with black: caudal bright yellow, stained with black at its extremity. Pectoral bright yellow, with a dark mark on the body below it which shows through the fin: ventral and anal finely dotted with black, but which fades soon after death, when all the shot colours also disappear, and it becomes of a dull green with the abdomen of a lighter colour. Posterior edge of caudal sometimes blackish with a white outer margin. In large specimens the colours differ, there are from five to eight dark longitudinal bands along the back and upper half of the body, the superior of which is occasionally broken up into spots. There are usually two golden bands below the lateral-line, and one along its course. In this stage it appears to closely resemble the description of *S. loo*,† C.V. viii, p. 52, which is said to grow to a larger size than *S. kanagurta*, and to be destitute of teeth. Günther observes of *S. Moluccensis*, Bleeker, that "this species is probably identical with *S. loo*, C.V."

Habitat.—Red Sea, through those of India to the Malay Archipelago. Along the coasts of India it is very rarely seen above 10 inches in length, but at the Andamans I obtained what appeared to be a distinct species a foot long, and differently coloured as described above. This fish I have captured at Madras, with fully developed ova in March. In Malabar it is very common throughout the cold season, and is extensively salted and dried. Although good eating, it is seldom brought to the table of Europeans, as it rapidly taints, and if eaten in that state gives rise to visceral irritation. Fig. 3 is from a Sind specimen $6\frac{1}{4}$ inches long: fig. 4 is from a Madras specimen 8 inches long: and fig. 5 from an Andamanese one 12 inches in length.

2. Scomber brachysoma.

? Scomber brachysoma, Bleeker, Makr. p. 356; Günther, Catal. ii, p. 361.

B. vii, D. 10 | $\frac{1}{11}$ + v, P. 22, V. 1/5, A. $\frac{1}{11}$ + v, C. 21, L. l. 135, L. tr. 13/.

Length of head $3\frac{3}{4}$, of caudal $5\frac{1}{2}$, height of body $3\frac{2}{3}$ in the total length. *Eyes*—with a broad anterior and posterior adipose lid, diameter of eye $4\frac{1}{3}$ in length of head, $1\frac{1}{3}$ diameters from end of snout, and $1\frac{1}{4}$ apart. Greatest width of head $2\frac{3}{4}$ in its length. Lower jaw slightly the longer: cleft of mouth deep, the maxilla reaches to below the hind edge of the eye. Length of preorbital 4/7 of that of the head, its greatest depth equalling 2/3 of that of the orbit. Hind edge of subopercle is vertically behind the level of the hind edge of the opercle. *Teeth*—minute in both jaws, none on vomer or palate. *Fins*—dorsal spines weak and receivable into a groove, the second and third the highest and rather above 1/2 that of the body, the upper edge of second dorsal fin concave, finlets commence just behind the fin and are opposite to and similar to those behind the anal. Pectoral half as long as the head. Caudal with deeply pointed lobes. *Colours*—similar to *S. microlepidotus*, except that there are two shining light spots above and behind either eye, and the spinous dorsal is posteriorly edged with black.

The height of the body in *S. brachysoma*, Bleeker, is said to be a little above three times in the total length. In the single specimen (if identical) from the Andaman islands it is $3\frac{2}{3}$.

Habitat.—The specimen described is $7\frac{1}{2}$ inches long and from the Andamans.

Genus, 2—Thynnus, *Cuv. and Val.*

Orcynus, Cuv.; *Grammatorcynus*, Gill.

Branchiostegals seven: pseudobranchiæ. Body oblong, somewhat compressed. Cleft of mouth deep. Small teeth on the jaws, vomer, and palatine bones. Two dorsal fins, the spines weak, finlets behind the soft dorsal and anal. Scales small: those in the anterior portion of the body form a kind of corselet. Lateral-line unarmed, a longitudinal keel along either side of the free portion of the tail. Air-vessel, when present, simple. Pyloric appendages numerous.

Geographical distribution—the "tunny fishes" are found from the Red Sea, throughout those of India to the Malay Archipelago and beyond. Also in most open tropical and temperate seas. They are very voracious, and may often be observed in schools pursuing the *Exoceti*, "flying fishes," or *Clupeidæ* as "sardines." As food

* Teeth in the upper jaw more or less disappear with age, except at the symphysis, where they are usually persistent.
† Steind. *l. c.* considers *S. microlepidotus* as the young of *S. loo.*

they are moderately esteemed: in the "Fauna Japonica," their flesh if eaten fresh is said to cause diarrhœa, therefore they are more commonly salted or dried.

SYNOPSIS OF SPECIES.

1. *Thynnus thunnina*, D. 15 | $\frac{3}{10-11}$ + viii, A. $\frac{3}{11}$ + viii. Length of pectoral from $6\frac{1}{4}$ to $6\frac{1}{2}$ in that of the total to the end of the centre of caudal fin. Undulating oblique dark bands along the back. Seas of India to the Malay Archipelago, also in the Mediterranean and tropical parts of the Atlantic.

2. *Thynnus pelamys*, D. 15 | $\frac{1-2}{12}$ + viii, A. $\frac{2}{12}$ + viii. Length of pectoral 1/6 of that of the total to the end of the centre of the caudal fin. Four or five concave longitudinal bands along the lower half of the sides of the body. Indian and Atlantic Oceans.

3. *Thynnus macropterus*, D. 14 | $\frac{3}{12}$ + ix, A. 12 + ix. Length of pectoral $3\frac{2}{3}$ in that of the total to the end of the centre of the caudal fin. Grayish above, becoming silvery on the sides and beneath. Tips of elongated dorsal and anal fins, also finlets, yellow. Seas of India to China.

1. Thynnus thunnina, Plate LIV, fig. 6.

Scomber quadripunctatus, Geof. Desc. Eg. Poissons, t. xxiv, f. 3.

Thynnus thunnina, Cuv. and Val. viii, p. 104, pl. 212; Temm. and Schleg. Fauna Japon. Poiss. p. 95, pl. 48; Cuv. Règ. Anim. Ill. Poiss. pl. 46, f. 1; Bleeker, Makr. p. 36, and Fische, Madag. p. 100; Guichen, Exp. Alg. Poiss. p. 57; Günther, Catal. ii, p. 364; Nilss. Æfvers. Sven. Vet. Ak. Förh. 1864, p. 499, t. 5.

Thynnus Brasiliensis, Cuv. and Val. viii, p. 110.

Thynnus affinis, Cantor, Catal. p. 106; Jerdon, M. J. L. and Sc. 1851, p. 136; Günther, Catal. ii, p. 363.

Suraly, Tam.

B. vii, D. 15 | $\frac{3}{10-11}$ + viii, P. 26, V. 1/5, A. $\frac{3}{11}$ + viii, C. 17.

Length of head $3\frac{1}{2}$ to $3\frac{3}{4}$, of pectoral $6\frac{1}{4}$ to $6\frac{1}{2}$, of caudal lobes $6\frac{1}{4}$, height of body $4\frac{1}{3}$ in the distance between the snout and the centre of the posterior edge of the caudal fin. *Eyes*—diameter $6\frac{1}{2}$ in length of head, $1\frac{1}{2}$ diameters from end of snout, and also apart. Head rather compressed, snout pointed: the maxilla reaches to below the middle of the orbit. Vertical or posterior border of the preopercle short, its angle rounded, and its lower edge at least twice as long as its vertical one. *Teeth*—in a single row in either jaw, also on vomer and palate. *Fins*—first dorsal spine the broadest, equal in height to the second, or 1/2 as long as the head. In some specimens the first dorsal is continued to within a short distance of the second, in others (as in the one figured) the last few spines are nearly or quite hidden in the integument. Second dorsal highest anteriorly, having a concave upper edge, its three spines are short and concealed by the skin: finlets rather large. Pectoral rather short. Ventral having an oval or elongated lamella between the two fins and under which they can be partially received. Anal similar to the second dorsal, commencing on the vertical behind that fin, its three spines equally concealed. Caudal broad and pointed. *Scales*—forming a corselet anteriorly in three portions separated by two deep emarginations. Superiorly the corselet embraces the two dorsal fins, and is divided from its central portion by an emargination which reaches to below the eighth dorsal spine. The central portion of the corselet is mostly beneath the pectoral fin, and the emargination which divides it from the inferior portion extends to below the base of the pectoral. The lowest portion goes to below and behind the ventral fins. *Colours*—bluish along the back having a number of undulating oblique dark bands, silvery below the lateral-line; sometimes black spots on the chest or breast.

Jerdon observes that this fish is called *Choori min*, Tam.

Geographical distribution.—Seas of India to the Malay Archipelago, where it is common during the cold months; also found in the Mediterranean, tropical parts of the Atlantic, and in Scandinavian seas. The specimen figured is from Bombay, where it is often seen in the markets during the cold season up to two feet in length.

2. Thynnus pelamys.

Scomber pelamys,* Linn. Syst. Nat. i, p. 492; Bl. Schn. p. 23; Shaw, Zool. iv, p. 588.

Scomber pelamides, Lacép. iii, p. 14 (pt.) ii, pl. xx, f. 2.

Thynnus pelamys, Cuv. and Val. viii, p. 113, pl. 214; Temm. and Schleg. Fauna Japon. Poiss. p. 96, pl. 49; Richards. Ich. China, p. 267; Cuv. Règ. Anim. Ill. Poiss. pl. 47, f. 2; Bleeker, Amboina, p. 41; Günther, Catal. ii, p. 365.

The Bonito.

B. vii, D. 15 | $\frac{1-2}{12}$+viii, P. 27, V. 1/5, A. $\frac{2}{12}$+vii.

Length of head $3\frac{1}{2}$, of pectoral 6, height of body $3\frac{1}{4}$ to $3\frac{1}{2}$ in the distance between the snout and the centre of the posterior margin of the caudal fin. *Eyes*—diameter 1/5 to 1/6 of length of head, $1\frac{1}{2}$ diameters from end of snout. The vertical border of the preopercle is 3/5 the length of its horizontal margin. *Fins*—dorsal spines rather weak, anteriorly 2/3 of height of body and nearly twice as high as the second dorsal. Pectoral

* See also Bennett, Whaling Voyage, ii, p. 281; De la Roche, Ann. Mus. xiii, p. 315. *Variletta*, Humboldt, Obs. Zool. ii, p. 190. *T. pelamys*, Yarrell, Parnell, Couch. *Thynnus vagans*, Less. Voy. Coq. Zool. ii, p. 162, pl. 32.

reaches to below the tenth dorsal spine. Anal similar to second dorsal, it commences on the vertical behind its last ray. Caudal with pointed lobes. *Scales*—forming a corselet anteriorly, which extends from the base of the pectoral along the whole length of that of the spinous dorsal. *Colours*—back bluish, becoming silvery on the sides and beneath. Four or five concave, longitudinal, dark bluish bands pass along the lower half of the abdomen posteriorly, ending on the lateral-line below the finlets.

I have not seen this species in India, but in Cuv. and Val. it is observed that it has been received from that locality.

Habitat.—Indian and Atlantic Oceans; attaining a considerable size.

3. Thynnus macropterus.

Temm. and Schleg. Fauna Japon. Poiss. p. 98, pl. 51; Bleeker, Makr. p. 37.

B. vii, D. 14 | $\frac{3}{12}$ + ix, P. 31, V. 1/5, A. 12 + ix, C. 28.

Length of head and height of body each $3\frac{2}{3}$ in the distance between the snout and the centre of the posterior margin of the caudal fin. *Eyes*—diameter 1/5 of length of head, $1\frac{1}{4}$ diameters from end of snout, and also apart. Maxilla reaches to below the first third of the eye: lower jaw a little the longer. Preopercle with its posterior margin somewhat irregular in shape, angle pretty well developed, the length of its vertical 1/3 longer than its horizontal margin. *Teeth*—in a fine single row in either jaw, in an angular patch prolonged posteriorly on the vomer, and in a band on the palatines. *Fins*—the anterior dorsal spines equal about $2\frac{1}{4}$ in the height of the body: second dorsal considerably longer than the spinous and falciform. Pectoral nearly or quite as long as the head. Anal similar to soft dorsal. Caudal with pointed lobes. Corselet with three distinct posterior prolongations, the upper commencing below the seventh dorsal spine, is continued along the base of the two dorsal fins: the second ceases below the eleventh dorsal spine, and a little above the middle of the body: the lowest extends along the abdomen to midway between the end of the ventral and commencement of the anal. A well developed keel on the lateral-line commencing from opposite the tenth finlet. *Colours*—grayish along the back becoming silvery below, tips of soft dorsal and anal, as well as the finlets, yellow.

Amongst the specimens sent me by Sir Walter Elliot is the one described above, it is a skin 27 inches long and probably Jerdon's specimen from Tellicherry. This is "*Thynnus* (*Orcynus*) ? Jerdon, M. J. L. and Sc. 1851, p. 136." Dr. Günther observes of *T. macropterus* that it is closely allied to, and perhaps identical with, *T. albacora*, Lowe, P. Z. Soc. 1839, p. 77, and Trans. Z. S. iii, p. 4.

Habitat.—Seas of India to Japan.

Genus, 3—Pelamys, *Cuv. and Val.*

Gymnosarda and *Orcynopsis*, Gill.

Branchiostegals seven: pseudobranchiæ. Body rather elongate and slightly compressed. Cleft of mouth deep. Rather strong teeth in jaws, none on vomer, present on palatines. Two dorsal fins, the spines feeble, or of moderate strength, finlets behind soft dorsal and anal fins. Scales small, those in the anterior portion of the body form a kind of corselet. Lateral-line unarmed, a longitudinal keel along either side of the free portion of the tail. Air-vessel absent. Pyloric appendages dendritical.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Pelamys Orientalis*, D. 18 | $\frac{3}{13}$ + viii, A. $\frac{3}{12}$ + vi. About eight longitudinal blue lines pass backwards and a little upwards in the upper half of the body. Seas of India to Japan and beyond.

1. Pelamys Chilensis, Plate LVI, fig. 1.

Pelamys Chilensis, Cuv. and Val. viii, p. 163; Gay, Chili, Zool. ii, p. 224; Günther, Catal. ii, p. 368; Steind. Sitz. Ak. Wiss. Wien, lvii, p. 353.

Pelamys Orientalis, Temm. and Schleg. Fauna Japon, p. 69, pl. 52; Günther, Catal. ii, p. 368.

B. vii, D. 18 | $\frac{3}{13}$-viii, P. 24, V. 1/5, A. $\frac{3}{12}$ + vi, C. 20.

Length of head $3\frac{1}{2}$, height of body $4\frac{3}{4}$ in the distance between the snout and the centre of the posterior edge of the caudal fin: caudal lobes 1/6 of the same distance. *Eyes*—diameter $8\frac{1}{4}$ in length of head, $2\frac{1}{2}$ diameters from end of snout and 2 apart. Snout pointed, the greatest width of head equals $2\frac{1}{4}$, and its height $1\frac{1}{2}$ in its length. The maxilla reaches to below the hind edge of the eye. Angle of preopercle rounded, its lower border rather above 1/2 the length of its vertical one. *Teeth*—in a single row in either jaw with some rather large ones above the symphysis of the lower. *Fins*—dorsal spines weak, second to fourth subequal and about $2\frac{3}{4}$ in height of body and very slightly higher than the second dorsal, it is continued nearly close up to the second fin. Pectoral $2\frac{1}{4}$ in length of head; ventral 3/4 of pectoral. Anal commences on the vertical below first finlet and is similar to second dorsal. Caudal with pointed lobes. *Scales*—forming a corselet anteriorly in three portions, separated by two deep emarginations. Superiorly the corselet embraces the whole length of the first dorsal fin: its central portion is narrow and pointed ending close to the end of the pectoral fin: its lower portion is small and just embraces the ventrals which have a small scale between them. *Lateral-line*—makes a low curve to below commencement of second dorsal fin, where its becomes straight.

Colours—the upper half of the body with about eight broad, straight, blue lines passing backwards and a little upwards, silvery below the lateral-line, where however there are similar lines but very faint.

Habitat.—Seas of India to Japan and beyond. The specimen figured (17 inches long) is from Bombay.

Genus, 4—CYBIUM, *Cuv.*

Apodontis and *Apolectus*, Bennett; *Lepidocybium* and *Acanthocybium*, Gill.

Seer-fishes.

Branchiostegals seven: pseudobranchiæ. Body somewhat elongated. Cleft of mouth deep. Teeth large and strong in the jaws: villiform on vomer, palatines, and tongue. Two dorsal fins, the first with feeble spines, extending to the commencement of the second, more rays in the second dorsal than spines in the first: seven or more finlets behind the second dorsal and anal fins. Scales, when present, rudimentary. A slight keel on either side of the caudal lobes. Air-vessel present.

The seer-fishes of India, when of the proper size, are considered as amongst the most delicate for eating of the marine forms. If small, as under a foot in length, they are dry, resembling *Trachynotus* and *Chorinemus*: from $1\frac{1}{2}$ to $2\frac{1}{2}$ feet in length they are at their primest size, above this they become coarse.

SYNOPSIS OF SPECIES.

1. *Cybium Kuhlii*, D. 16 | $\frac{5-6}{17-18}$ + viii, A. $\frac{4}{18}$ + vii. Head $5\frac{1}{6}$ to 6, height of body 5 in the total length. Lateral-line with a gradual curve. Sides silvery: first dorsal black. Seas of India.

2. *Cybium interruptum*, D. 16 | $\frac{4}{15-16}$ + viii-ix, A. $\frac{2}{17}$ + viii-ix. Head $5\frac{1}{4}$, height of body $5\frac{3}{4}$ in the total length. 28 to 30 teeth in upper, and about 24 in lower jaw. Body with three rows of horizontally elongated blotches: first dorsal nearly black. Seas of India.

3. *Cybium guttatum*, D. 16-17 | $\frac{5}{14-15}$ + viii-x, A. $\frac{3}{18-19}$ + vii-ix. Head 5 to $5\frac{1}{3}$, height of body 5 in the total length. 10 to 12 teeth in either jaw. Body with three rows of elongated blotches: first dorsal black to the eighth spine, the rest pure white edged with black. Seas of India.

4. *Cybium Commersonii*, D. 16-17 | $\frac{3-4}{13-14}$ + ix-x, A. $\frac{2-3}{12-13}$ + ix-x. Head 4 to 5, height of body $5\frac{1}{2}$ to 7 in the total length. Lateral-line with a strong bend below twelfth dorsal ray. Undulating vertical spots and lines on the sides. First dorsal black to the end of seventh spine, behind pure white with a black upper edge. Red Sea, seas of India to the Malay Archipelago and beyond.

5. *Cybium lineolatum*, D. 16 | $\frac{4}{12}$ + ix, A. $\frac{5}{14}$ + x. Head 5, height of body $6\frac{1}{2}$ in the total length. Several rows of horizontally elongated dark spots along the sides. Seas of India to ? the Malay Archipelago.

1. **Cybium Kuhlii**, Plate LVI, fig. 2.

Cybium Kuhlii, Cuv. and Val. viii, p. 178.

B. vii, D. 16 | $\frac{5-6}{17-18}$ + viii, P. 29, V. 1/5, A. $\frac{4}{18}$ + vii, C. 21.

Length of head $5\frac{1}{2}$ to 6, of caudal $3\frac{3}{4}$ to 4, height of body 5 in the total length. *Eyes*—diameter 1/5 of length of head, $1\frac{1}{2}$ diameters from end of snout, and also apart. Greatest width of head equals 1/2, and its height equals 4/5 of its entire length. Maxilla reaches to below the hind edge of the eye. Preopercle emarginate along its vertical border, with the lower limb almost as long as the hind one. *Teeth*—conical and rather compressed, from 15 to 20 in either jaw, those in the lower much the larger: vomerine patch anteriorly rounded, in a band along the palatines. *Fins*—first dorsal spines weak, second dorsal anteriorly equals 3/4 of the height of the body below it, there are six unarticulated rays at its commencement hidden in the skin, the anal which commences on a vertical line below its centre is similar to it but not so high. Pectoral as long as the head behind the middle of the eye. Ventrals equal $1\frac{1}{3}$ diameters of the eye in length. Caudal with deeply pointed lobes. *Lateral-line*—containing about 200 plate-like rounded scales, each having a simple tube, is straight until it arrives opposite the end or middle of the base of the second dorsal, where it curves to below the third finlet and then becomes rather wavy, its central keel well-developed. *Colours*—bluish above becoming silvery on the side and below. After death the sides assume a dark hue and have neither bands or spots. First dorsal black: second dorsal and also anal with dark bases: pectoral with a light outer edge, tips of caudal dark.

Habitat.—Seas of India. The specimen figured (from Bombay) is $14\frac{1}{2}$ inches in length, but it attains a much larger size.

2. **Cybium interruptum**, Plate LVI, fig. 3.

Scomber wingeram, Russell, Fish. Vizag. ii, p. 26, pl. 134.

Scomber leopardus, Shaw, Zool. iv, p. 591.

Cybium interruptum, Cuv. and Val. viii, p. 172; Jerdon, M. J. L. and Sc. 1851, p. 136; Günther, Catal. ii, p. 371.

Buck-ku, Gwadur.

B. vii, D. 16 | $\frac{4}{15-16}$ + viii-ix, P. 21, V. 1/5, A. $\frac{2}{17}$ + viii-ix, C. 21.

Length of head $5\frac{1}{4}$, of caudal 5, height of body $5\frac{3}{4}$ in the total length. *Eyes*—diameter $4\frac{1}{2}$ in length of head, $1\frac{1}{4}$ diameters from end of snout, and also apart. Greatest width of head equals $2\frac{1}{4}$ in its length, and its height equals its length behind the posterior nostril. Maxilla reaches to below the middle of the eye. Vertical limb

of preopercle emarginate. *Teeth*—comparatively small, equal sized, conical and somewhat compressed, about 28 or 30 in the upper, and 24 rather larger ones in the lower jaw, they are placed close together as shown in Russell's figure: in a patch rounded anteriorly and slightly emarginate laterally on the vomer, and in a band along the palatines. *Fins*—dorsal spines weak: second dorsal commences midway between the anterior nostril and the base of the caudal fin, anteriorly it is 1/2 the height of the body, its upper edge concave: anal commences below the first third of the second dorsal which fin it resembles. Caudal deeply forked. *Lateral-line*—with a gradual descent. *Colours*—bluish along the back becoming white on the sides and below, three rows of elongated blotches along the sides, almost forming interrupted bands, the two upper sets of blotches cross the lateral-line below the second or third finlet: first dorsal dark, its outer edge nearly black.

The above appears to be Russell's fish, the number of teeth separates it from the *C. guttatum*, (Bl. Schn.) C. V. It is also most probably *C. interruptum*, C. V., from Pondicherry, which is said to have 28 teeth in the upper and 16 in the lower jaw.

Habitat.—Seas of India. The specimen figured (from Madras) is a little over 15 inches, it attains at least 3 feet in length.

3. Cybium guttatum, Plate LV, fig. 1 (*young*) and LVI, fig. 4 (*adult*).

Scomber guttatus, Bl. Schn. p. 23, f. v.

Cybium guttatum, Cuv. and Val. viii, p. 173; Richards. Ich. China, p. 268 (pt.); Cantor, Catal. p. 111; Bleeker, Makr. p. 38; Günther, Catal. ii, p. 371; Day, Fish. Malabar, p. 71; Kner, Novara Fische, p. 143.

Cybium lineolatum, Cantor, Catal. p. 110.

B. vii, D. 16-17 | $\frac{4-5}{14-15}$ + viii-x, P. 21, V. 1/5, A. $\frac{3}{17-19}$ + vii-ix, C. 26.

Length of head 5 to $5\frac{1}{3}$, of caudal $4\frac{1}{2}$ to 5, height of body 5 in the total length. *Eyes*—diameter $5\frac{1}{4}$ to $5\frac{1}{2}$ in the total length, 2 diameters from end of snout, and $1\frac{1}{2}$ apart. Greatest width of head equals 1/2 its length, and its height equals its length behind the anterior nostril. The maxilla reaches to below the hind edge of the eye. Vertical limb of preopercle slightly emarginate. *Teeth*—lancet-shaped, laterally compressed, and somewhat wide apart, about 10 to 12 in either jaw and frequently some smaller ones likewise present for taking the place of any lost; they are much longer in the lower jaw: in a triangular patch on the vomer, and in a band on the palatines. *Fins*—first dorsal spines weak, and ending in soft points: second dorsal highest anteriorly where it equals 4/7 of that of the body below it, and has a concave upper edge: anal commences below the first third of the soft dorsal. *Lateral-line*—having a very gradual descent, it becomes somewhat undulating opposite the commencement of the second dorsal, and very much so below the third and fourth finlets. The keel on the lateral-line well developed. *Colours*—bluish above, silvery beneath: back and sides with three rows of round or rather horizontally oval spots, which become most apparent after death: the membrane between the first and eighth spines black, the rest pure white edged with black: in the young the first dorsal is occasionally almost wholly black.

Habitat.—Seas of India, Malay Archipelago, and China. Grows to 6 feet in length, is good eating, and salts well. Specimens under a foot in length are dry, from two to two-and-a-half feet long they are in the best condition, above that they become coarse. They should be cooked when quite fresh. They are also one of the best fish for "Tamarind fish." Are captured in numbers from October throughout the cold months along all the Indian coasts.

Cantor's specimen of *C. lineolatum*, in the British Museum, has the formula of the fins as above, and 11 or 12 teeth in either jaw. The specimen figured, Pl. LV, f. 1 (from Canara) is 9 inches long, the older one Pl. LVI, fig. 4, is from Madras.

4. Cybium Commersonii, Plate LVI, fig. 5.

Scomber Commersonii, Lacép. ii, p. 600, pl. 20, f. 1; Shaw, Zool. iv, pp. 589 and 590, pl. 83.

Scomber maculosus, Shaw, Nat. Misc. No. 982, and Zool. iv, p. 592.

Scomber konam, Russell, ii, p. 27, pl. 135.

Cybium Commersonii, Cuv. Règ. Anim.; ? Rüpp. Atl. Fische, p. 94, t. 25, f. 1; Cuv. and Val. viii, p. 165; Rüpp. N. W. Fische, p. 41 (pt.); Richards. Ich. China, p. 268; Cantor, Catal. p. 108; Jerdon, M. J. L. and Sc. 1851, p. 136; Günther, Catal. ii, p. 370; Day, Fish. Malabar, p. 69; Klunz. Verh. z. b. Ges. Wien, 1871, p. 444.

Cybium konam, Bleeker, Makr. p. 357; ? Kner, Novara Fische, p. 144.

Chumbum, Mal.; *Konam*, *Mah-wu-laachi*, or *Ah-ku-luh*, Tam.

B. vii, D. 16-17 | $\frac{3-4}{13-14}$ + ix-x, P. 20-23, V. 1/5, A. $\frac{2-3}{12-13}$ + ix-x, C. 21.

Length of head 1/4 to 1/5, of caudal 1/5 to 2/11, height of body 2/11 to 1/7 of the total length. *Eyes*—diameter 2/9 to 1/5 of length of head, $1\frac{1}{2}$ to 2 diameters from end of snout, and $1\frac{1}{2}$ apart. Greatest width of head equals 3/7, and its height 3/5 of its length. The maxilla reaches to below the centre or hind edge of the orbit. Posterior border of preopercle rather emarginate, and its angle rounded and slightly produced. *Teeth*—strong, conical, compressed laterally, those in the upper jaw varying in number from about 11 to 25, the posterior ones being rather the smallest. In the lower jaw there are from 10 to 15 of the same shape, but the posterior ones are the largest. A triangular group of villiform teeth on the vomer, and a long narrow band on the palatines.

Fins—the spines of the first dorsal are weak, and end in thin filamentous points projecting beyond the membrane, which is deeply notched. The second dorsal highest in front with its upper margin concave, it is situated opposite the anal which it resembles. Ventral small: pectoral pointed: caudal with pointed lobes each with a raised soft oblique ridge along its base. *Lateral-line*—at first in upper third of body, opposite the twelfth or thirteenth dorsal ray it bends down, making a second strong curve from opposite the first to the third pairs of finlets, beyond which it passes direct to the centre of the caudal where it ends in a soft raised keel between the bases of either lobe. *Colours*—bluish above, silvery below: first dorsal black to the end of the seventh spine, behind which it is pure white, having a narrow black upper edge: basal half of pectoral black. After death numerous vertical undulating lines and spots appear on the sides, in the specimen figured (from Madras) they are very distinct, but during life they are rather indistinct.

Habitat.—Red Sea, East coast of Africa, seas of India to the Malay Archipelago and beyond; it attains at least 4 feet in length.

5. Cybium lineolatum.

Cuv. and Val. viii, p. 170; Belanger, Voy. p. 366, pl. 2, f. 1; Griffith in Cuv. An. Kingdom, Fishes, pl. 48, f. 1; Bleeker, Makr. p. 40; Günther, Catal. ii, p. 370.

B. vii, D. 16 | $\frac{4}{12}$ + ix, P. 21, V. 1/5, A. $\frac{5}{14}$ + x, C. 15.

Length of head 1/5, of caudal 1/5, height of body 2/13 of the total length. *Eyes*—diameter $4\frac{1}{2}$ in length of head, $1\frac{1}{4}$ apart. *Teeth*—about 18 in either jaw, triangular and strongly compressed, the central ones in the lower being the largest: in a triangular pointed patch on the vomer, and in a band on the palatines. *Fins*—spines of first dorsal slender. Pectorals $8\frac{1}{2}$ in the total length: ventrals 1/3 of pectoral. *Lateral-line*—at first in upper fourth of body, descends gradually towards the end of the second dorsal fin until it arrives below the fifth finlet. *Colours*—bluish above, silvery on the sides and beneath: several rows of elongated black blotches on the body, three rows of them, like interrupted lines, being below the lateral-line.

Cuv. and Val.'s specimen was in a bad state, and a difficulty occurred in counting the number of rays, the species appears to somewhat resemble *C. guttatum*, C. V. (it has fewer teeth than in *C. interruptum*, C. V.) but is stated to have less rays. Bleeker, Beng. en Hind. (1853, p. 42) places it as a synonym of *C. interruptum*, C. V. ? Cantor's type specimen also appears to be *C. interruptum*.

Habitat.—Seas of India to ? Malay Archipelago.

Genus, 5—Elacate, *Cuv.*

Meladerma, Swainson.

Branchiostegals seven: pseudobranchiæ. Body fusiform: head depressed. Cleft of mouth of moderate depth. Villiform teeth on the jaws, vomer, palatine bones, and tongue. The first dorsal reduced to a few free spines: the second with many rays and somewhat similar to the anal: no finlets. Scales very small. No keel on the side of the tail. Air-vessel absent. Pyloric appendages dendritical.

The immature of this fish, as seen in the seas of India, has its central caudal rays exceedingly prolonged: as age advances, as $8\frac{1}{2}$ inches, the fin becomes more obtuse, but still the central rays are rather the longest: in a specimen 12 inches long that fin is obtuse, in another 11 inches long it is slightly emarginate: in the adult it becomes concave or almost lobed, the lower being usually the longer.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Elacate nigra*, D. 8 | 28-36. A. $\frac{2}{25-29}$. Brown, with two longitudinal black bands. Seas of India to Japan and beyond.

1. Elacate nigra, Plate LV, fig. 2.

Scomber niger, Bloch, t. 337; Bl. Schn. p. 35.

Centronotus Gardenii, Lacép. iv, p. 357.

Scomber peddah mottah, Russell, Fish. Vizag. ii, p. 39, pl. 153.

Elacate Pondiceriana, Cuv. and Val. viii, p. 329; Rüpp. N. W. Fische, p. 43, t. xii, f. 3; Jerdon, M. J. L. and Sc. 1851, p. 139.

Elacate motta, Cuv. and Val. viii, p. 332; Bleeker, Makr. p. 42.

Elacate Malabarica, Cuv. and Val. l. c.; Cuv. Règ. An. Ill. Poiss. pl. 54, f. 2.

Elacate bivittata, Cuv. and Val. viii, p. 338; Temm. and Schleg. Fauna Japon. Poissons, p. 104, pl. 56; Richards. Ich. China, p. 269; Cantor, Catal. p. 116; Jerdon, M. J. L. and Sc. 1851, p. 139.

Meladerma nigerrima, Swainson, Fishes, ii, p. 243.

Elacate Canada, Holb. Ich. South Carol. p. 95, pl. 14, f. 1.

Elacate nigra, Günther, Catal. ii, p. 375; Day, Fish. Malabar, p. 73; Klunz. Verh. z. b. Ges. Wien, 1871, p. 445; Bleeker, Madagascar, p. 98.

Cuddul verarl, Tam.

B. vii, D. 8 | 28-36, P. 21, V. 1/5, A. $\frac{2}{25-29}$, C. 17, Vert. 12/13.

Length of head $4\frac{3}{4}$ to 5, of caudal $5\frac{1}{4}$ to 6, height of body $7\frac{1}{4}$ to 8 in the total length. *Eyes*—diameter $4\frac{1}{2}$ to 5 in the length of head, $1\frac{1}{3}$ to 2 diameters from end of snout, and about 2 apart. Mouth wide, the maxilla reaches to below the anterior edge or first third of the eye. Greatest width of head equals its height, or its length excluding the snout. Upper surface of head flat, and stellately rugose. *Teeth*—villiform. *Fins*—dorsal free spines with a very short interspinous membrane. Second dorsal highest anteriorly where its rays equal the height of the body, its upper edge slightly concave. Anal similar to second dorsal, but rather lower, it arises on the vertical below the seventh or eighth dorsal ray, its two first rays are short and undivided. Pectoral 1/2 longer than ventral, and equalling the length of head without the snout. Caudal with its central rays much the longest in the immature, becoming moderately or deeply lunated in the adult. *Colours*—olivaceous brown, having a dark band along the back below the base of the dorsal fin and another along the centre of the side. Fins brownish, with dark or black edges. Outer edges of caudal lobes white.

Habitat.—Seas of India to Japan, also stated to be found in the tropical parts of the Atlantic and along the shores of the United States. The one figured (from Madras) is $13\frac{1}{2}$ inches in length. A specimen 4 feet 10 inches in length exists in the Madras Museum. March, 1867, I took a female, 30 inches long, full of well developed ova. In February, 1867, I examined the contents of the stomach of one, and found the remains of numerous small fishes.

Genus, 6—Echeneis, *Artedi.**

Remoropsis, *Rhombochirus*, *Remilegia*, *Leptecheneis*, *Phtheirichthys*, Gill.

Branchiostegals seven or eight: pseudobranchiæ. Body elongated, fusiform: head depressed and superiorly furnished with an adhesive organ. Eyes lateral or directed downwards and outwards. Cleft of mouth deep. Villiform teeth on the jaws, vomer, palatine bones, and generally on the tongue. The first dorsal fin modified on the summit of the head and occiput, into an adhesive disk; a long second dorsal and anal: no finlets: ventrals thoracic. Scales very small. No keel on the side of the tail. Air-vessel absent. Pyloric appendages in moderate numbers.

Geographical distribution.—These fishes appear to be inhabitants of nearly all seas. In those of India they are most commonly captured adhering to sharks, and are consequently considered to be parasitic on those animals. Van Beneden (Bull. Ac. Belg. 1870, xxx, pp. 181-185) has however shown that sometimes, at least, they prey upon fishes.

The shape of the caudal fin in these fishes changes with age, as observed in *Elacate*.

SYNOPSIS OF SPECIES.

1. *Echeneis neucrates*, D. 22-25 | 33-41, A. 32-38. A dark band along the body. Seas of temperate and tropical reigons.
2. *Echeneis remora*, D. 17-18 | 22-24, A. 24-25. General brown colour. Seas of temperate and tropical regions.
3. *Echeneis brachyptera*, D. 15-16 | 26-32, A. 24-27. Light brown, end of caudal whitish. Seas of India to China, also Madeira, and the coast of North America, and the Brazils.
4. *Echeneis albescens*, D. 12-13 | 17-22, A. 19-22. Seas of India, Japan, and the Cape.

1. Echeneis neucrates, Plate LVII, fig. 1.

Linn. Syst. i, p. 446; Gmel. Linn. p. 1188; Forsk. p. xvi, No. 7; Bloch, ii, p. 131, t. 171; Bl. Schn. p. 239; Shaw, Zool. iv, p. 209, pl. 31; Bennett, Life Raffles, p. 692; Bleeker, Fish. Madag. p. 98.

Echeneis naucrates, Lacép. iii, pp. 146, 162, pl. ix, f. 2; Cuv. Règ. Anim.; Cantor, Catal. p. 199; Tem. and Schleg. Fauna Japon. p. 270, pl. 120, f. 1; Richards. Ich. China, p. 203; Günther, Ann. and Mag. Nat. Hist. May, 1860, p. 395, and Catal. ii, p. 384 (see syn.); Day, Fish. Malabar, p. 75; Kner, Novara Fische, p. 146; Klunz. Verh. z. b. Ges. Wien, 1871, p. 446.

Echeneis neucrates, Russell, Fish. Vizag. i, p. 39, and *Ala mottah*, pl. 49.

Echeneis albicauda, Mitchell, Am. Monthly Mag. ii, p. 244.

Echeneis lunata, Bancroft, Proc. Zool. Soc. i, p. 134, and Zool. Journ. v, p. 411, pl. xviii.

Echeneis Australis, Griffith, in Cuv. An. King. Fishes, p. 504.

Echeneis vittata, Lowe, Proc. Zool. Soc. 1839 p. 89, 1850 p. 252, and Trans. Zool. Soc. iii, p. 17; Rüpp. N. W. Fische, p. 82.

Echeneis fusca, Gronov. ed. Gray, p. 92.

Putthu-muday, "Catching mouth," Mal.: *Ubbay*, Tam.

B. vii, D. 22-25 | 33-41, P. 20, V. 1/5, A. 32-38, C. 17.

Length of head $5\frac{1}{3}$ to 6, including disk $3\frac{1}{2}$ to $4\frac{1}{2}$, of disk $4\frac{1}{4}$ to 5, of pectoral $7\frac{2}{3}$ to 8, of caudal 8, width between pectorals $10\frac{1}{4}$ to $11\frac{1}{2}$, height of body $11\frac{1}{2}$ to $12\frac{1}{2}$ in the total length. *Eyes*—transversely oval, directed obliquely outwards and downwards, $2\frac{1}{2}$ to 3 diameters in the postorbital length of head, 2 to 3 diameters from end of snout, $3\frac{1}{2}$ to $4\frac{1}{2}$ apart superiorly, and 3 to 4 inferiorly. The disk or modified first dorsal fin is situated on the summit of the head and occiput, is about 2/5 as wide as long, containing from twenty-one to twenty-five

* The fishes of this Genus form the sub-family Echeneidina, Cantor, or the Family Echeneoidei, Bleeker. Cantor observes that the Malays consider these fish to be a powerful manure for fruit trees.

transverse laminæ, having a tooth-like posterior margin to each, whilst along the central line runs a smooth elevation so that the vacuum may be confined to only one half of the disk. The most anterior of the laminæ are directed slightly forwards, the second quarter are nearly transverse, and the posterior go backwards, the difference between each and the one succeeding it being very gradual. External to this disk is a wide fleshy membrane, which posteriorly extends to over the occiput, but anteriorly does not reach as far as the end of the upper jaw, the whole acting as a sucker. Maxilla extending about as far as the anterior margin of the orbit in the immature, or to only beneath the third lamina in a specimen $2\frac{1}{2}$ feet in length. Mandibula pointed and covered superiorly with numerous rows of villiform teeth, forming a triangular toothed space in advance of the upper jaw, which last is pointed. *Fins*—pectoral situated over the posterior margin of the opercle, and opposite the posterior quarter of the bony disk. First dorsal forming the disk: second dorsal and anal opposite one another, both highest in front, where the rays equal from $2\frac{1}{4}$ to $2\frac{2}{3}$ the length of the disk, outer edge of both fins rather concave, and the last rays slightly produced. Ventral pointed, and placed almost horizontally. Caudal with its posterior margin straight, but having four short notches at its extremity. *Scales*—minute. *Lateral-line*—rather undulating. *Colours*—generally brownish gray, with the external margins of the caudal and the anterior tips of the dorsal and anal fins edged with white: pectoral of a deep brown: anal tipped with dark brown: centre of caudal nearly black. Sometimes a blackish band along the middle of the side.

Habitat.—Red Sea, seas of India, Malay Archipelago, and tropical and temperate seas generally: attains at least 3 feet in length: this is the commonest form in the Indian seas, the one figured is 8 inches in length.

2. Echeneis remora.

Remora imperati, Willughby, Append. p. 5, t. ix, f. 2.

Echeneis remora, Linn. Syst. i, p. 446; Gmel. Linn. 1187; Bloch, ii, p. 134, pl. 172; Bl. Schn. p. 240; Lacép. iii, pp. 146, 147, t. ix, f. 1; Shaw, Zool. iv. p. 202, pl. 31; Temm. and Schleg, Fauna Japon. Poissons, p. 271; Lowe, Trans. Zool. Soc. iii, p. 16; Jenyns, Voy. Beagle, p. 142; Günther, Ann. and Mag. May, 1860, p. 390, and Catal. ii, p. 378 (see Synon.); Kner, Novara Fische, p. 146; Bleeker, Madagascar, p. 99.

Echeneis Jacobœa and *pallida*, Lowe, P. Z. S. 1839, p. 89.

Echeneis remoroides, Bleeker, Batoe, ii, p. 70.

Echeneis parva, Gronov. ed. Gray, p. 92.

? *Echeneis borboniensis*, Guich. in Maillard, Reunion, Append. p. 19.

B. vii, D. 17-18 | 22-24, P. 20, V. 1/5, A. 24-25, C. 17, Cæc. pyl. 6, Vert. 12/15.

Length of head $4\frac{1}{3}$, with disk 1/3, of disk alone $3\frac{1}{4}$, of caudal 1/6, height of body 1/9, breadth between pectoral fins 1/6 to 1/7, length of pectorals $7\frac{3}{4}$, of ventrals $8\frac{1}{4}$ in the total length. *Eyes*—situated in the centre of the length of the head, $3\frac{1}{2}$ diameters from end of snout, and 5 apart superiorly. Mouth rounded. *Teeth*—the outer lateral row in the lower jaw enlarged. *Fins*—first dorsal or disk in its widest part equals half its length. Second dorsal commences midway between the base of the pectoral and the base of the caudal, its highest rays equal the length of the head excluding the snout. Anal opposite the second dorsal. Caudal forked in a specimen 9 inches long. *Colours*—brown.

Habitat.—Seas of temperate and tropical regions.

3. Echeneis brachyptera, Plate LV, fig. 3.

Lowe, Proc. Zool. Soc. 1839, p. 89; and Trans. Zool. Soc. p. 17; Günther, Ann. and Mag. May, 1860, p. 399, and Catal. ii, p. 378.

Echeneis sexdecim-lamellata, Eydoux et Gervais, Voy. Favor. v, Zool. p. 77, pl. xxxi.

Echeneis pallida, Temm. and Schleg. Fauna Japon. Poiss. p. 271, pl. 120, f. 2, 3.

Echeneis Nieuhofii, Bleeker, Sumatra, ii, p. 279.

B. vii, D. 15-16 | 26-32, P. 20, V. 1/5, A. 24-27, C. 17.

Length of head $4\frac{1}{2}$, including disk $3\frac{2}{3}$, of disk alone $4\frac{1}{3}$, of caudal $6\frac{1}{3}$, height of body $8\frac{1}{4}$, width at pectorals $6\frac{2}{3}$ to $7\frac{1}{2}$, length of pectoral 1/10, of ventral $7\frac{1}{2}$ in the total length. *Eyes*—diameter $2\frac{1}{4}$ in the postorbital portion of the head, $2\frac{1}{4}$ diameters from end of snout, $3\frac{1}{2}$ apart superiorly, and 3 inferiorly. Upper jaw rather angular: the maxilla reaches posteriorly to below the front edge of the eye or beneath the fourth lamina of the disk. *Teeth*—the outer lateral row in the lower jaw is somewhat enlarged. *Fins*—greatest width of disk equals half its length. The second dorsal commences midway between the posterior edge of the eye and the base of the caudal, its highest portion equals the postorbital length of the head. The anal commences on a vertical below the third or fourth dorsal ray to which fin it is similar. Caudal very slightly emarginate. *Scales*—rudimentary. *Colours*—of a light brown with the posterior edge of the caudal whitish.

Habitat.—Seas of India to China, also Madeira, and the coasts of North America and Brazil. The specimen figured (life-size) is from Madras.

4. Echeneis albescens, Plate LVII, fig. 2.

Echeneis albescens, Temm. and Schleg. Fauna Japon. p. 272, pl. 120, f. 3; Günther, Catal. ii, p. 377.

Echeneis clypeata, Günther, Ann. and Mag. Nat. Hist, May, 1860, p. 401; and Catal. ii, p. 376.

? *Echeneis lophioides*, Guich. in Maill. Reunion, App. p. 20.

Remora albescens, Bleeker, Ternate, 1863, p. 2.

B. vii, D. 12-13 | 17-22, P. 19, V. 1/5, A. 19-22, C. 15.

Length of head $4\frac{3}{4}$, including disk $3\frac{1}{2}$, of disk 4, width of body between pectorals $5\frac{1}{4}$, of caudal $8\frac{1}{4}$ in the total length. *Eyes*—$2\frac{1}{2}$ diameters in the postorbital portion of the head, $2\frac{1}{4}$ from end of snout, 6 apart superiorly, and slightly less inferiorly. Body wide anteriorly, width of sucker equals 2/3 of its length. Mouth obtuse: lower jaw the longer, the maxilla reaches to below the hind nostril or the third lamina of the disk. *Teeth*—villiform in jaws, vomer, and palatines: an outer enlarged series in lower jaw and vomer. *Fins*—second dorsal commences in the second third of the distance between the bases of pectoral and caudal fins, and opposite the anal. Ventral equals the distance between the eye and base of pectoral. Caudal very slightly emarginate. *Scales*—rudimentary. *Colours*—uniform brown.

The specimen figured (12 inches in length and stuffed) is from Sir W. Elliot's collection, and very curiously resembles partly Dr. Günther's species and partly *E. albescens*, Temm. and Schleg. Agreeing with the latter, it has 13 laminæ, the length of the disk 1/4 of the total, mouth obtuse, angle of mouth below the third lamina, the length of the ventrals equals the distance between the base of the pectoral and the posterior margin of the eye. But instead of 22 rays in the second dorsal it has 17, and A. 19 instead of 22, still this variation is not more than is observed in some of the other species.

Habitat.—Seas of India, Japan, and the Cape.

Family, XX—URANOSCOPIDÆ, *Richardson.*

Koraké, Tamil.

Branchiostegals from five to seven: pseudobranchiæ. Body low and more or less cylindrical. Gill-openings wide. Eyes on the upper surface of the head. Head mostly cuirassed with bony plates. Infraorbital ring of bones does not articulate with the preopercle. Usually villiform teeth in both jaws, canines present or absent, but no molars. One or two dorsal fins, the spines being fewer in number than the rays. Ventral with one spine and five rays. Pectoral rays branched. No prominent papilla near the vent. Scales when present rudimentary. Lateral line continuous. Air-vessel absent. Pyloric appendages when present few or in moderate numbers.

In Cuv. and Val. the genus *Uranoscopus* was divided into (1) those with two dorsal fins; and (2) those with one.

SYNOPSIS OF GENERA.

1. *Uranoscopus.* Two dorsal fins. Scales small. Seas of India.
2. *Ichthyscopus.* A single dorsal fin. Head armed with bony plates. Scales rudimentary. Seas of India.

Genus, 1—Uranoscopus, *Cuv.*

Branchiostegals six: pseudobranchiæ. Body somewhat cylindrical. Head large, broad, and partly covered with bony plates. The opercles and shoulder-bones usually armed. Besides the posterior gill-opening there is generally a rounded orifice above the opercle. Eyes on the upper surface of the head. Cleft of mouth vertical, with a filament below, or before the tongue. Villiform or cardiform teeth on the jaws, vomer, and palatine bones, no canines. Two dorsals, the first with from three to five spines: ventrals jugular. Scales small and rudimentary. Lateral-line continuous. Air-vessel absent. Pyloric appendages in moderate numbers.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Uranoscopus guttatus*, D. 4-5 | 12-13, A. 13. Strong shoulder spines. Chestnut or slaty-brown, with light spots in the upper half of its body and head: a black blotch at upper portion of spinous dorsal fin. Seas of India.

1. **Uranoscopus guttatus,*** Plate LV, fig. 4.

Cuv. and Val. iii, p. 305; Cuv. Règ. Anim. Ill. Poissons, pl. 17, f. 2; Bleeker, Beng. en Hind. p. 34; Griffith in Cuv. An. King. Fishes, p. 128, pl. 24, f. 3; Jerdon, M. J. L. and Sc. 1851, p. 142; Günther, Catal. ii, p. 228.

Uranoscopus marmoratus, Jerdon, M. J. L. and Sc. 1851, p. 142; Day, Proc. Zool. Soc. 1867, p. 702, (? Cuv. and Val. iii, p. 304.)

B. vi, D. 4-5 | 12-13, P. 17, V. 1/5, A. 13, C. 13.

Length of head $3\frac{1}{3}$ to $3\frac{1}{2}$, of pectoral 4 to $4\frac{1}{4}$, of caudal 5 to $5\frac{1}{4}$, height of body 4 to $4\frac{1}{4}$ in the total length. *Eyes*—on the upper surface of the head, 1/2 a diameter from end of snout, and $1\frac{1}{4}$ apart. Greatest width of head rather exceeds its height. Cleft of mouth nearly vertical: lips with a narrow fringe: nostrils situated in front of the centre of the eye. Four to seven spines along the lower edge of the preopercle, and one on subopercle. Two large spines on shoulder-bone, the lower the larger and equalling 2 diameters of the orbit. Posterior border of occiput with one central and on either side two more little bony lobes, the posterior of which has one or two spines. Bones of the head roughened like the impressions of a thimble. *Teeth*—two or three rows of card form ones in either jaw, becoming laterally a single one in the lower: smaller teeth on vomer and palatines. *Fins*—dorsal spines weak, the first the longest, but only 2/3 as high as the soft dorsal. Caudal rather rounded. *Scales*—present on the body, except above the first part of the lateral-line, and on the breast and chest to the commencement of the anal fin: they are not imbricated but covered by skin, and are in rows bounded by muciferous channels. *Lateral-line*—goes from the shoulder to the base of the second dorsal, along which it is continued, it has a few rounded scales above it behind the base of the second dorsal spine. *Colours*—chestnut or slaty-brown, with two or three rows of bluish white spots along the back and half way down the sides. First dorsal pure white, with its upper two-thirds black, from the first to midway between the third and fourth spines: second dorsal black along its upper two-thirds: caudal with a wide

* *Uranoscopus affinis*, C. V. iii, p. 304; Günther, Catal. ii, p. 227, appears to be closely allied to *U. cognatus*, Cantor. It is said to have D. 5 | 12, A. 13. The spine at the shoulder is 2/3 the length of the pectoral, and the black dorsal blotch extends from the second to the fourth dorsal spines. It is stated to have come from the Indian Ocean, but India is not distinctly indicated.

vertical black band covering its middle third: anal white with a black base: pectoral dark, its lower margin edged with white.

Habitat.—Seas of India, said to attain a foot in length: the largest I captured at Madras is $7\frac{1}{2}$ inches, the one figured (life-size) is from the same locality.

Genus, 2—ICHTHYSCOPUS, *Swainson.*

Uranoscopus, sp., Cuv. and Val.: *Anema*, Günther.

Branchiostegals six: pseudobranchiæ. Body somewhat cylindrical. Head large; broad, and partly covered with bony plates. Gill-openings without any superior orifice. Eyes on the upper surface of the head. Cleft of mouth vertical. Some of the bones of the head may be armed. No filament below or before the tongue. Villiform teeth on upper jaw, vomer, and palatines, in a single conical row in the lower jaw. One continuous dorsal fin with less spines than branched rays, the latter portion similar to the anal: ventrals jugular. Scales rudimentary. Air-vessel absent. Pyloric appendages in moderate numbers.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Ichthyscopus inermis*, D. $\frac{3-4}{16-18}$, A. 16-19. Canary-yellow, with buffy markings along the back and sides, enclosing pure white round or oval spots. Seas of India to Japan.

1. Ichthyscopus inermis, Plate LV, fig. 5.

Uranoscopus le Beck, Bloch, Syst. p. 47.

Uranoscopus inermis, Cuv. and Val. iii, p. 310, pl. 65; Temm. and Schleg. Fauna Japon. Poissons, p. 27, pl. 10 A; Jerdon, M. J. L. and Sc. 1851, p. 142; Günther, Catal. ii, p. 230; Day, Fish. Malabar, p. 46.

Ichthyscopus inermis, Swainson, Fishes, ii, p. 269.

Nillum koranjan, "A diver into the mud," Tam.

B. vii, D. 8 | $\frac{3-4}{16-18}$, P. 18, V. 1/5, A. 16-19, C. 11, Cæc. pyl. 9 (8).

Length of head 3 to $3\frac{1}{4}$, of caudal $5\frac{1}{2}$, height of body 4 to $4\frac{1}{4}$ in the total length. *Eyes*—situated considerably before the middle of the length of the head and on its upper surface. Greatest width of head equals 3/4 of its length, and its height 5/6 of the same extent. Cleft of mouth nearly vertical: lips covered with numerous branched papillæ. Anterior nostril round, situated in front of the centre of the eye and surrounded with papillæ resembling those on the lips, similar ones likewise surround the large oval posterior nostril which is situated along the inner side of the orbit. No spines on the head or shoulder: the posterior edge of the occiput straight and entire: posterior edge of opercle fringed. An elongated angular flap edged with papillæ behind the shoulder. *Teeth*—in villiform rows in the upper jaw; in a single row of widely separated conical ones in the lower jaw, and sometimes a few villiform ones posteriorly above the symphysis: villiform on vomer and palatines. *Fins*—dorsal spines weak, and not so high as the rays. Pectoral $4\frac{2}{3}$ and ventral $5\frac{1}{2}$ in the total length. Caudal slightly rounded. *Scales*—present on the body, except above the lateral-line, on the breast, chest, and to about the sixth anal ray, they are not imbricated but covered by the skin, and are laid in rows, each being bounded by a muciferous channel. *Lateral-line*—goes from the shoulder to the base of third dorsal spine, and is continued close to the base of that fin in its whole length. *Colours*—canary-yellow, with buffy-brown markings along the sides, enclosing pure white round or oval spots, also some of the same white colour on the pectoral and dorsal fins. Upper surface of the head brownish: caudal brownish-yellow with dark extremities, a dark bar across the pectoral and caudal fins.

On March 23rd, 1868, a fine male specimen was brought to me alive, and placed in water having a bed of mud, into which it rapidly worked itself, first depressing one side and then the other, until only the top of its head and mouth remained above the mud, whilst a constant current was kept through its gills. If lifted out of the water, it squirted fluid from its mouth for some distance; whilst in the mud it looked like a frog. It made a curious noise, half snapping and half croaking, when removed from its native element.

Habitat.—Seas of India to Japan, said to live in the mud and be taken with difficulty. The specimen figured (about 12 inches in length) is from Canara.

Family, XXI—TRACHINIDÆ, (*Swains.*) *Günther.*

Branchiostegals from five to seven: pseudobranchiæ. Body more or less elongated, posteriorly compressed: head often large. Eyes more or less lateral. Cleft of mouth, almost horizontal, lateral, or even nearly vertical. Some of the bones of the head usually armed: the suborbital ring of bones articulates with the preopercle. Teeth in the jaws, present or absent on the vomer and palatines. Dorsal fins sometimes in two distinct portions but more or less connected: the spines may be in excess of the rays, but as a rule there are more of the latter: anal generally similar to the soft dorsal: ventrals thoracic: pectorals with or without appendages. Body scaleless, scaled, or with a single series of plate-like scales. Lateral-line continuous. Air-vessel present or absent. Pyloric appendages few.

SYNOPSIS OF GENERA.

1. *Percis.* A single dorsal fin, the spines (4 or 5) short and continuous at their base with the soft portion. Ventrals a little anterior to the pectorals. Canine teeth: no palatine teeth. Red Sea, throughout those of India to the Malay Archipelago.

2. *Sillago.* Two dorsal fins, the first with 9 to 12 spines, slightly separated from the second. Muciferous system of head well developed. Ventrals thoracic. No palatine teeth. Red Sea, seas of India to the Malay Archipelago and beyond.

Genus, 1—Percis, *Bl. Schn.*

Parapercis, Bleeker.

Branchiostegals six: pseudobranchiæ. Body rather elongated and sub-cylindrical: head a little depressed. Eyes lateral, directed somewhat upwards. Cleft of mouth slightly oblique: lower jaw the longer. Opercle with one or two spines: pre- and sub- opercles are sometimes slightly serrated. Villiform teeth in the jaws, with an outer enlarged row, some of which are canine-like: teeth also on the vomer, but not in the palatines. The first dorsal fin with four or five spines, more or less continuous with the second dorsal, which has a moderate number of rays, and is similar to the anal: ventrals slightly anterior to the pectorals, the rays of which are branched. Scales ctenoid, rather small. Air-vessel absent. Pyloric appendages, when present, few.

Geographical distribution.—From the Red Sea and East coast of Africa, through the seas of India to the Malay Archipelago and beyond. The common forms on the Coromandel coast of India are small, the larger, *P. hexophthalma*, I have only taken at the Andamans, and it is not figured in Sir W. Elliot's collection of Indian Fishes.

SYNOPSIS OF SPECIES.

1. *Percis punctata*, D. 5 | 21-22, A. $\frac{1}{17-18}$, L. l. 58-60, L. tr. 5/16. Pre- and sub- opercles serrated. Diameter of eyes 1/4 of length of head. Caudal rather rounded. Vertically banded, a few black spots in the bands. Soft dorsal with three rows of black spots: caudal with two grayish bands: ventral slate-coloured. Seas of India.

2. *Percis pulchella*, D. 5 | 21-22, A. $\frac{1}{17}$, L. l. 60-62, L. tr. 5/18. Preopercle entire, a few serrations may exist on subopercle. Diameter of eye $3\frac{2}{3}$ in length of head. Caudal cut square, with its upper ray a little prolonged. Body with six vertical bands: head with dark spots superiorly, three blue bands go from the eye over the sub- and inter- opercles. A row of spots along the soft dorsal fin: five rows of yellow spots along the anal. Lower half of caudal darker than the upper, which is barred. East coast of Africa, seas of India to Japan.

3. *Percis hexophthalma*, D. 5 | 19-21, A. 17-18, L. l. 62, L. tr. 7/21. Pre- and sub- opercles entire. Diameter of eye 1/5 of length of head. Caudal cut square, with its upper ray a little prolonged. Upper part of body gray with vertical lines: a row of three white spots each having a black centre along the abdomen: opercles with narrow stripes below the eyes. A black blotch on caudal fin. Red Sea, East coast of Africa, seas of India to the Malay Archipelago and beyond.

1. **Percis punctata**, Plate LVIII, fig. 1.

? *Percis punctata*, Cuv. and Val. iii, p. 264; Günther, Catal. ii, p. 238.

B. vi, D. 5 | 21-22, P. 16-17, V. I/5, A. $\frac{2}{17-18}$, C. 15, L. l. 58-60, L. tr. 5/16.

Length of head from $4\frac{1}{2}$ to 5, of caudal 7 to $7\frac{1}{2}$, height of body 6 to $6\frac{1}{2}$ in the total length. *Eyes*—diameter 1/4 of length of head, 1 to $1\frac{1}{4}$ diameters from end of snout, and 1/4 of a diameter apart. Greatest width of head equals its length behind the middle of the eye, its height equals 1/2 its length. Snout sharp: cleft of mouth somewhat oblique, lower jaw a little the longer, the maxilla reaches to nearly below the front edge of the eye. Greatest depth of preorbital equals half the diameter of the eye. Preopercle coarsely

serrated along its posterior limb: opercle with a well marked spine, the edge of the subopercle serrated. A shoulder spine. *Teeth*—above the symphysis of the lower jaw an outer enlarged row of about eight curved teeth, the external of which is the largest: a villiform band on the vomer. *Fins*—spines of first dorsal of moderate strength, the fourth the longest equalling $1\frac{1}{3}$ diameters of the eye in length, the third is a quarter shorter, the fifth spine midway between the height of the first and second. Pectoral as long as the head excluding the snout: ventral reaches the vent. Caudal cut square or a little rounded. *Scales*—four entire and two half rows between the lateral-line and the base of the first dorsal fin. *Colours*—whitish with reddish-brown vertical bands and blotches above the lateral-line, which are interrupted along the middle of the body; on these bands are a few black spots. A bright golden line goes from below the orbit to the base of the dorsal fin, and another from the centre of the eye to the snout. Spinous dorsal with or without a row of black spots: soft dorsal with three rows on the rays: caudal with two grayish bands, one at its base the other at its posterior third, and sometimes an ocellus at the upper part of the base of the caudal fin: anal yellowish: ventrals slate-coloured.

There are three objections to uniting *P. punctata* with Dr. Günther's fish, (1) its having five instead of four spines to the first dorsal fin, but the latter being only a single specimen such may be an individual anomaly: likewise (2) the height of its body is 6—$6\frac{1}{2}$ instead of $7\frac{2}{3}$ in the total length: lastly (3) the colours differ. But as Dr. Günther's type is, at least, semi-putrid, the existence of colours could not be expected. The preopercle and opercle are both serrated in *P. millepunctata*, whilst the fish described above is common along the Coromandel coast of India, and would doubtless extend to Ceylon.

A figure of this fish exists amongst Sir W. Elliot's drawings termed *Kul ooloova.*

P. punctata, C. V., has no characters or colours assigned to it that do not exist in this species.

Habitat.—Coromandel coast of India and (? Ceylon): attaining at least 5 inches in length at Madras.

2. Percis pulchella, Plate LVIII, fig. 2.

? *Percis maculata*, Bl. Schn. p. 179, pl. 38.

Percis pulchella, Temm. and Schleg. Fauna Japon. Poiss. p. 24, pl. 10, f. 2; Richards. Ich. China, p. 211; Günther, Catal. ii, p. 240.

B. vi, D. 5 | 21-22, P. 18, V. 1/5, A. $\frac{1}{17}$, C. 17, L. l. 60-62, L. tr. 5/18.

Length of head $4\frac{1}{3}$ to $4\frac{1}{2}$, of caudal 7, height of body $6\frac{1}{2}$ in the total length. *Eyes*—diameter $3\frac{2}{3}$ in length of head, 1 diameter from end of snout, and 1/4 of a diameter apart. Greatest width of head equals its length behind the middle of the eye, its height equals half its length. Snout not so pointed as in *P. punctata.* Cleft of mouth somewhat oblique, lower jaw slightly the longer, the maxilla reaches to below first third of eye. Greatest depth of preorbital equals half the diameter of the eye. Preopercle entire: subopercle with two or three serrations just below the opercle, which latter has a well marked spine. *Teeth*—anterior row in front of upper jaw enlarged as are likewise those in the lower consisting of 6 or 8, which are strong and recurved, also there are some enlarged teeth laterally in the mandibles: in a band on vomer. *Fins*—spines of first dorsal rather strong, first short, the fourth the longest and equal to the diameter of the eye, the fifth about equals the second. Pectoral as long as the head without the snout. Ventral does not quite reach the vent. Caudal cut square with its upper ray a little prolonged. *Scales*—four entire and two half rows between the lateral-line and the base of the first dorsal fin. *Colours*—reddish, with six crossbands of a darker colour: a light pinkish band along the side, becoming yellow along the centre of the caudal fin, head spotted with dark purplish black marks superiorly: three well-marked vertical blue bands across the sub- and inter- opercles, and sometimes a fourth crosses the breast in front of and to below the pectoral fin. Dorsal fins yellow, black in their lower halves: the soft with a single row of spots along its upper half: anal yellowish in its lower two-thirds, with five rows of round canary-coloured spots: its outer third reddish: ventrals reddish, stained at their edges. Caudal yellow along its centre, dark reddish in its lower half, some fine vertical bars in its upper half.

Both *P. punctata* and *P. pulchella* are found at Tranquebar, from whence *P. maculata*, Bl. Sch. was obtained. Its preopercle is shown serrated as in *P. punctata*, the markings on the head, body, and caudal fin agree with *P. pulchella*, but the colours on dorsal and anal fins resemble neither. Dr. Günther, Catal. ii, p. 237, refers it with doubt to *P. nebulosa. P. pulchella* is the fish referred to by Jerdon (M. J. L. and Sc. 1851, p. 144,) "*Rupiscartes*—one of Swainson's subgenus occurs at Madras." Sir W. Elliot's figure is thus named by Jerdon, it is said to be termed *Varna natiooli*, Tam.

Habitat.—East coast of Africa, seas of India to Japan. The specimen figured (life-size) is from Madras.

3. Percis hexophthalma, Plate LVII, fig. 4.

(Ehrenb.) Cuv. and Val. iii, p. 271, vii, p. 507; Günther, Catal. ii, p. 239, Fish. Zanz. p. 68.

Percis cylindrica, Rüpp. Atl. Fische, p. 19, t. v, f. 2, (not *Sciæna cylindrica*, Bl.=*P. cylindrica*, C. V.)

Percis caudimaculata, Rüpp. N. W. Fische, p. 98; Bleeker, Perc. p. 54.

Parapercis hexophthalmus, Bleeker, Guébé, 1868, p. 2.

Percis polyophthalma, Klunz. Verh. z. b. Ges. Wien, 1870, p. 816.

B. vi, D. 5 | 19-21, P. 17, V. 1/5, A. 17-18, C. 15, L. l. 62, L. tr. 7/21.

Length of head 4, of caudal $6\frac{1}{2}$, height of body $6\frac{1}{2}$ in the total length. *Eyes*—diameter 1/5 of length of head, $1\frac{1}{2}$ diameters from end of snout, and nearly 2/3 of a diameter apart. Greatest width of head equals its

length without the snout, and its height equals 4/7 of its length. Snout somewhat pointed. Cleft of mouth rather oblique, the maxilla reaches to below the front edge of the eye. Greatest depth of preorbital equals 1 diameter of the eye. Preopercle entire: a spine on opercle and another at shoulder. *Teeth*—outer row in upper jaw enlarged, as are also 8 or 10 of the anterior ones in the lower jaw, also four or five of the outer ones in the middle of the lateral teeth: teeth on vomer. *Fins*—fourth dorsal spine longest and equal to 1 diameter of the orbit. Pectoral equals 3/4 of the length of the head. Ventral reaches the anal. Caudal cut square, having its upper ray a little prolonged. *Colours*—upper half of body and head grayish-brown with irregular vertical gray lines, also one or two narrow and interrupted or entire lines along the side: three or more white spots each having a black centre along either side of the abdomen. Some narrow dark lines pass obliquely backwards and downwards from the eye over the sides of the head, others go directly backwards. A black spot on the base of the first dorsal, its edges also dark: three rows of black spots along the soft dorsal which also has a dark edge, one along the anal. A large black blotch on the caudal extending half its length, and having a large white blotch behind it, the whole of the caudal vertically barred with spots.

In the "Catal. of Fishes of the British Museum," *P. polyophthalma* is united with *P. hexophthalma*, but in the Fishes of Zanzibar they are again separated for the reasons advanced in Cuv. and Val.: that all the specimens with three ocellated spots on each side (*P. hexophthalma*), have about ten narrow oblique brown lines radiating from the lower part of the eye, over the opercles, whilst the specimens with six or seven ocelli on each side (*P. polyophthalma*) have the sides of the head dotted.

Habitat.—Red Sea, East coast of Africa, seas of India to the Malay Archipelago and beyond. The specimen figured (from the Andamans) is 8 inches in length.

Genus, 2—SILLAGO,* *Cuv.*

Sillaginodes and *Sillaginopsis*, Gill.

Branchiostegals six: pseudobranchiæ. Body elongated, somewhat cylindrical. Head conical, with its muciferous system well developed. Gill-openings wide: eyes lateral or directed slightly upwards. Cleft of mouth short: the upper jaw the longer. Preopercle serrated or crenulated: opercle ending in a point. Villiform teeth in the jaws with the outer row rather conical, also present on vomer, none on the palatines. Two dorsal fins, the first with nine to twelve spines, which are less than the rays (19-27) of the soft dorsal, which last is similar to the anal: ventrals thoracic, with one spine and five rays: lower pectoral rays branched. Scales ctenoid. Lateral-line not continued on to the caudal fin. Air-vessel simple. Pyloric appendages few.

These fishes having much the appearance of *Sciæna* and placed in that genus by Bloch, are esteemed light and wholesome food: as they ascend rivers and tidal estuaries they may be captured almost throughout the year.

Geographical distribution.—Red Sea, seas of India to the Malay Archipelago and beyond.

SYNOPSIS OF SPECIES.

1. *Sillago domina*, D. 9 | $\frac{1}{25-27}$, A. $\frac{1}{26-27}$, L. l. 90. Second dorsal spine very elongate. Upper portion of Bay of Bengal to Burma and the Malay Archipelago.

2. *Sillago sihama*, D. 10-11 | $\frac{1}{20-23}$, A. $\frac{1}{22-23}$, L. l. 70-74, L. tr. 5-6/12. Eyes, diameter 4 to 5 in length of head. A silvery longitudinal band: minute black points on dorsal and anal fins. Red Sea, seas of India to the Malay Archipelago and beyond.

3. *Sillago maculata*, D. 11 | $\frac{1}{20}$, A. $\frac{1}{21}$, L. l. 70, L. tr. 6/10. Eyes, diameter $2\frac{3}{4}$ in length of head. Dark blotches along the sides, first dorsal superiorly black. Andamans and the Malay Archipelago to S.E. Australia.

1. Sillago domina, Plate LVIII, fig. 3.

Cuv. and Val. iii, p. 415, pl. 69; Cuv. Règ. Anim. Ill. Poiss. pl. 13, f. 1; Swainson, Fishes, ii, p. 205; Cantor, Catal. p. 21; Günther, Catal. ii, p. 246.

Sillaginopsis domina, Gill. Proc. Nat. Hist. Soc. Phil. 1861, p. 505.

Yarra-soring, Tel.: *Tool-danti*, Ooriah.

B. vi, D. 9 | $\frac{1}{25-27}$, P. 24, V. 1/5, A. $\frac{1}{26-27}$, C. 19, L. l. 90, L. tr. 5-6/14, Cæc. pyl. 4.

Length of head $3\frac{3}{4}$ to 4, of pectoral 6, of caudal 7 to 8, height of body 7 to 8 in the total length. *Eyes*—situated in the commencement of the anterior half of the head, $3\frac{1}{2}$ to 4 diameters from end of snout, and $1\frac{1}{2}$ to 2 apart. Body, subcylindrical. Head depressed, pyriform: cheeks, swollen. Greatest width of head equals $2\frac{1}{4}$, and its height $2\frac{1}{3}$ in its length: upper jaw the longer: the maxilla extends to half way between the snout and the anterior extremity of the orbit: opercle with a very small spine in the centre of its posterior margin: other opercles entire. *Teeth*—villiform in both jaws with an external conical row, the largest (four) being in the centre of the upper jaw. A transverse semicircular band of villiform ones on the vomer. *Fins*—dorsal commences slightly behind the pectoral, its first spine short, its second of varying length, but in large specimens appears usually to extend to the base of the caudal fin, there are some fine scales on the interspinous membrane between it and the third spine. Second dorsal rather highest in front where it equals 2/3 of the height of the body: pectoral rounded. The first two rays of the anal are undivided and have articulated extremities, form of fin similar to that of the second dorsal: caudal lobed, the upper the longer. *Scales*—strongly ctenoid, in regular horizontal rows, extending over cheeks, and between the eyes, as far forwards as the anterior nostril. Some fine ones over the base of the pectoral and nearly to the extremity of caudal. *Lateral-line*—descends very gently

* Family, SILLAGINIDÆ, *Richardson.*

to opposite about the seventh ray of anal fin, from whence it proceeds direct to the centre of the caudal. *Colours*—greenish-yellow shot with purple.

Habitat.—Coromandel coast of India, where it is caught in droves in October, Bay of Bengal as low as Pondicherry,* and also in the Ganges, Burma, and Malay Archipelago. It attains at least 10 inches in length, the one figured is from Calcutta.

2. **Sillago sihama**, Plate LVII, fig. 3.

Atherina sihama, Forsk. p. 70.
Sciæna Malabarica, Bl. Schn. p. 81, t. xix.
Platycephalus sihamus, Bl. Schn. p. 60.
Sparus soring, Russell, ii, p. 9, pl. 113.
Sillago sihama, Rüpp. Atl. Fische, p. 9, t. iii, f. 1, and N. W. Fische, p. 100; Gunther, Catal. ii, p. 243; Day, Fish. Malabar, p. 47; Klunz. Verh, z. b. Ges. Wien, 1870, p. 818; Bleeker, Revis. Sill. 1874, p. 67.
Sillago acuta, Cuv. and Val. iii, p. 400; Jerdon, M. J. L. and Sc. 1851, p. 131; Bleeker, Perc. p. 61; Kner, Novara Fische, p. 128.
Sillago erythræa, Cuv. and Val. iii, p. 409.
Sillago Malabarica, Cantor, Catal. p. 21; Bleeker, Bali, iii, p. 157.
Soring, or *Tella-soring*, or *Arriti-ki*, Tel.: *Culingah*, Tam.: *Cudeerah*, Mal.: *Thol-o-dah*, And.: *Nga-rui*, Mugh.

B. vi, D. 10-11 | $\frac{1}{20-23}$, P. 20, V. 1/5, A. $\frac{1}{22-23}$, C. 19, L. l. 70-74, L. tr. 5-6/12, Cæc. pyl. 3-4,† Vert. 19/15.

Length of head 1/4 to 2/9, of caudal 1/8 to 1/9, height of body 1/6 to 2/15 of the total length. *Eyes*—diameter 4 to 5 in length of head,‡ $1\frac{1}{3}$ to $2\frac{1}{4}$ diameters from end of snout, and 1 to $1\frac{1}{4}$ apart. Snout pointed. Greatest width of head equals its height or half of its length. Upper jaw slightly the longer: the maxilla reaches nearly half way to below the front edge of the eye. Vertical limb of preopercle serrated in its lower half. Opercle with a well developed spine. *Teeth*—villiform in both jaws, the outer row sometimes a little enlarged: in a semi-circular band on the vomer. *Fins*—dorsal spines of moderate strength, second and third subequal in length and as high as the body below them: second dorsal highest anteriorly where it equals 4/7 of that of the body. Pectoral as long as the head excluding the snout, and rather longer than the ventral. Anal below and similar to soft dorsal but not so high. Caudal emarginate or obtuse. *Scales*—about six rows between the lateral-line and the last dorsal spine. *Air-vessel*—extends posteriorly to opposite the first third of the anal fin. *Colours*—olive-green along the back, becoming light on the abdomen, the whole having a brilliant purple reflection: a silvery longitudinal band: minute black points on the dorsal and anal fins.

Habitat.—Red Sea, seas of India to the Malay Archipelago and beyond, it ascends tidal rivers. It is known as *Whiting* at Madras. Native women who have young babies are advised to eat it, as it is said to be even more nourishing than shark's flesh. It attains a foot in length. M. Leschenault asserted that he had seen them, although seldom, 3 feet long. The one figured is from Madras.

3. **Sillago maculata**, Plate LVIII, fig. 4.

Quoy and Gaim. Voy. Freyc. Zool. p. 261, pl. 53, f. 2; Cuv. and Val. iii, p. 411; Bleeker, Perc. p. 62, and Revis. Sill. 1874, p. 71; Günther, Catal. ii, p. 245; Kner, Novara Fische, p. 127.
Sillago Bassensis, Cuv. and Val. iii, p. 412; Quoy and Gaim. Voy. Astrol. Poiss. p. 672, pl. i, f. 2.

B. vi, D. 11 | $\frac{1}{19-20}$, P. 17, V. 1/5, A. $\frac{1}{20-21}$, C. 18, L. l. 70, L. tr. 6/10.

Length of head $3\frac{3}{4}$, of caudal $7\frac{1}{3}$, height of body $5\frac{1}{2}$ in the total length. *Eyes*—diameter $2\frac{3}{4}$ in length of head, $1\frac{1}{2}$ diameters from end of snout, and 3/4 of a diameter apart. Greatest width of head equals $2\frac{1}{3}$, and its height $1\frac{1}{2}$ in its length. Snout rather pointed, upper jaw a little the longer: the maxilla reaches nearly half way to below the front edge of the eye. Vertical limb of preopercle finely serrated: opercle with a small spine. *Teeth*—villiform in either jaw, the outer row a little enlarged: also in a band on the vomer. *Fins*—dorsal spines weak, third to fifth subequal in length, nearly as high as the body, and rather higher than the soft portion of the fin. Pectoral as long as the head excluding the snout: ventral a little shorter. Anal similar to second dorsal. Caudal lobed. *Colours*—grayish along the back, becoming dull white on the abdomen: some irregular blackish blotches along the sides, also a silvery median longitudinal band. Upper half of first dorsal black, outer edges of second dorsal and anal dark, and a gray band along the upper third of soft dorsal.

Habitat.—Andamans, Malay Archipelago to South-East Australia. The specimen figured (life-size) is from the Andamans. It is said to attain 8 or 9 inches in length.

* In Cuv. and Val. this species is termed "Pêche Madame de Pondicherry." Jerdon observes, "I never saw a specimen of the *Sillago domina* at Madras, and the fishermen to whom I showed the drawing said they did not know it. Pondicherry is only 80 miles from Madras, and I doubt therefore if it was sent from thence; most probably it is more from the months of the Ganges." I have taken it at Coconada but that is the lowest point in the Bay of Bengal where I have observed it. Some might however easily stray down to Pondicherry.

† Cuv. and Val. found 2 cæcal appendages, I have sometimes found 4, occasionally 3, 2 being short and 1 long.

‡ Respecting the diameter of the eye in the length of the head, I have found it $4\frac{1}{4}$ at 4 inches; 4 at 5 inches; $4\frac{1}{8}$ at $5\frac{1}{2}$ inches; $4\frac{1}{2}$ at $7\frac{1}{2}$ inches; $4\frac{2}{3}$ at 9 inches; $4\frac{1}{2}$ at $9\frac{1}{3}$ inches; $5\frac{1}{4}$ at 9 inches; and 5 at 10 inches or the total length of the specimen.

Family, XXII—PSEUDOCHROMIDES, *Mull. and Trosch.*

Branchiostegals from five to seven: pseudobranchiæ. Body more or less elongated. Eyes more or less lateral. Cleft of mouth oblique. Bones on the head unarmed or obtuse points on the opercle: head not cuirassed. The suborbital ring of bones articulates with the preopercle. Teeth in the jaws, present or absent on the vomer or palatines. Dorsal fin consisting of two portions which are connected, usually more rays than spines: anal similar to, or of less extent than the soft dorsal: ventrals thoracic or jugular: pectorals without appendages. Body scaled. Scales feebly cycloid or ctenoid. Lateral-line interrupted or incomplete. Air-vessel present or absent. Pyloric appendages, when present, in small numbers.

Bleeker, with much reason, objects to the union of the Genus *Opisthognathus* with the *Pseudochromides*. He considers the Opisthognathidæ as forming a distinct family, intermediate between the Blenniidæ and Pseudochromides, and distinguished by having a scaleless head, cycloid scales, edentulous palate. Ventral fins well developed and jugular, possessing five soft rays, the two anterior of which are simple, thick, and elongated: dorsal and anal spines very weak and flexible, whilst the number of rays in the anal about equals those of the soft dorsal: caudal with twelve branched rays.

SYNOPSIS OF GENERA.

1. *Opisthognathus.* Cleft of mouth large. Palate edentulous. Scales cycloid. Lateral-line incomplete. Red Sea, those of India to the Malay Archipelago, also Brazils.

2. *Pseudochromis.* Lower jaw the longer. Teeth in jaws, vomer, and palate. Scales ctenoid. Lateral-line interrupted.

Genus, 1—Opisthognathus, *Cuv.*

Gnathypops, Gill.

Branchiostegals six: pseudobranchiæ. Body more or less elongated, and posteriorly rather compressed. Upper profile of snout parabolic. Eyes lateral, large. Cleft of mouth deep, the upper jaw being either produced in a styliform process to beyond the angle of the preopercle, or truncated a little behind the level of the hind edge of the eye. Fine teeth in jaws, with an outer enlarged row: palate edentulous. Dorsal and anal spines weak and flexible (10-13), *rays* (13-17) *similar to those of the anal: anal with two flexible spines: ventrals jugular: pectoral rays branched. Scales cycloid, small. Lateral-line not continued so far as the caudal fin. Air-vessel small. Cæcal appendages absent.*

Geographical distribution.—Red Sea, those of India to the Malay Archipelago and beyond, also Brazil.

This Genus has been subdivided by Mr. Gill into (1) those species in which the maxilla is produced backwards into a styliform process, (2) such as have the maxilla truncated *(Gnathypops)*.

SYNOPSIS OF SPECIES.

1. *Opisthognathus nigromarginatus*, D. $\frac{14}{12}$, A. 16-18. Maxilla produced backwards to beyond angle of preopercle. Buff marbled with darker. Dorsal fin light with a black ovate spot between the fourth and eighth dorsal spines. Red Sea to the Malay Archipelago.

2. *Opisthognathus Rosenbergii*, D. $\frac{10}{14}$, A. $\frac{2}{12}$. Maxilla truncated, reaching to just behind posterior edge of eye. Marbled: dorsal and anal fins black edged, the former with four or five large blotches along its base. Madras to the Malay Archipelago.

1. Opisthognathus nigromarginatus, Plate LVII, fig. 5.

Rüppell, Atl. Fische. p. 114, t. xxviii, f. 4; Swainson, Fishes, ii, p. 278; Günther, Catal. ii, p. 254; Klunz. Verh. z. b. Ges. Wien, 1871, p. 486.

Opisthognathus Sonneratii, Cuv. Règ. Anim.; Cuv. and Val. xi, p. 498; Swainson, Fishes, ii, p. 278; Jerdon, M. J. L. and Sc. 1851, p. 144.

Opisthognathus Cuvieri,* Val. Cuv. Règ. Anim. Ill. Poiss. pl. 78, f. 3 (? C. and V. xi, p. 498).

B. vi, D. $\frac{14}{12}$, P. 20, V. 1/5, A. 16-18, C. 12.

* Some error may have occurred in Cuv. and Val. as the figure, pl. 78, f. 3, does not represent the colours attributed to *O. Cuvieri*. I obtained the *O. Cuvieri* at Madras, but have mislaid it. Amongst Sir W. Elliot's drawings are three of this species, D. 25, A. 17. The maxilla is produced backwards, as in *O. nigromarginatus*, and the membrane has the same black marks. Body buff colour, with an irregular chestnut band along the side, and two or three more of whitish spots: head with white spots. Dorsal fin

Length of head 1/4, of caudal 1/9 to 1/10, height of body 1/6 of the total length. *Eyes*—diameter 1/4 of length of head, 1/2 a diameter from end of snout, and 1/4 of a diameter apart. Greatest width of the head is rather above 1/2 its length. Snout obtuse: cleft of mouth commences anteriorly opposite the middle of the eyes: the maxilla is elongated and reaches at its posterior extremity to the base of the pectoral fin, it has a membraneous connection with the cheek. Opercles entire. *Teeth*—in a rather large row of curved ones in either jaw, with a few villiform ones posteriorly at the symphysis. *Fins*—dorsal spines weak, not quite so high as the rays. Pectoral as long as 4/9 of length of head: ventral slightly longer. Caudal rounded. *Scales*—small. *Lateral-line*—ceases below middle of dorsal fin. *Colours*—yellowish marbled with brown, inside of upper jaw with two deep bluish bands on a white ground, one of which shows along the upper edge of the maxilla. Dorsal fin with a dark blue ovate spot between its fourth and eighth spines, cloudy marks and spots over the fin: base of anal light coloured, externally dark.

Habitat.—Red Sea, seas of India.

2. **Opisthognathus Rosenbergii**, Plate LVIII, fig. 5.

Bleeker, Nias, p. 220; Günther, Catal. ii, p. 256.
Gnathypops Rosenbergii, Bleeker, Opisthognathoidei (1873), p. 9, fig. 1.
Natsooli, Tam.

B. vi, D. $\frac{10}{14}$, P. 21, V. 1/5, A. $\frac{2}{14}$, C. 12, L. l. 76.

Length of head $4\frac{1}{4}$, of caudal $6\frac{1}{2}$, height of body 5 in the total length. *Eyes*—diameter $3\frac{1}{4}$ in length of head, 1/2 a diameter from end of snout, and 1/6 of a diameter apart. Greatest width of head equals 4/7 of its length, and its height its length excluding the snout. Snout obtuse. Cleft of mouth commences anteriorly opposite the middle of the eye: the maxilla (the length of which equals that of the postorbital portion of the head) reaches to rather beyond the vertical from the hind edge of the eye, it is truncated and does not nearly extend to the angle of the preopercle. Opercles entire. *Teeth*—villiform opposite the symphysis in either jaw, with an outer row of enlarged and somewhat curved ones in either jaw (largest in the upper), which are continued along their rami. *Fins*—dorsal spines weak, and not so high as the rays. Pectoral as long as the head behind the eye. Ventral reaches more than half way to vent. Caudal rounded. *Scales*—about 26 rows below the lateral-line to the commencement of the anal fin, none above it so far as the end of the spinous dorsal. *Lateral-line*—on raised scales, smaller than those on the body, the tubes are short and unbranched. *Colours*—appear to vary somewhat, the one figured (life-size) from Madras, has the body somewhat blotched, the dorsal and anal fins edged with black, and four large black blotches on the lower two-thirds of that fin: ventrals black. In a drawing amongst Sir W. Elliot's collection the dorsal and caudal are blacker, with five white bands on the former, and two white spots on the latter fin. Bleeker's figure shows five black blotches along the lower half of the dorsal fin, and the caudal white with two wide black bands.

Habitat.—Seas of India to the Malay Archipelago. The one figured is the only one I obtained at Madras. It is probably a small species, and apparently rare.

Genus, 2—Pseudochromis, *Rüpp.*

Labristoma, Swains.; *Leptochromis*, Bleeker.

Branchiostegals six: pseudobranchiæ. Body rather elongated and compressed. Eyes lateral. Cleft of mouth slightly oblique, lower jaw the longer. Jaws with a single row of teeth laterally, an outer enlarged row anteriorly in premaxillaries, canines in the lower jaw: teeth on vomer and palate. Preopercle entire. A single dorsal fin having a few (2-7) *spines anteriorly: pectoral rays branched: ventrals thoracic. Scales of moderate size. Air-vessel present. Pyloric appendages absent.*

Geographical distribution.—Red Sea, seas of India to the Malay Archipelago.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Pseudochromis xanthochir*, D. $\frac{3}{26}$, A. $\frac{3}{15}$, L. l. 41, L. tr. $\frac{3-5}{14}$. First six dorsal rays unbranched. Olive colour: dorsal with yellow spots, anal and base of caudal with brown ones, outer half of caudal yellow.

1. **Pseudochromis xanthochir**, Plate LVIII, fig. 6.

Bleeker, Celebes, p. 443, and Revis. Pseudochr. p. 17, t. 1, f. 3, 4; Günther, Catal. ii, p. 257.

B. vi, D. $\frac{3}{26}$, P. 17, V. 1/5, A. $\frac{3}{15}$, C. 17, L. l. 41, L. tr. $\frac{3-5}{14}$.

Length of head $3\frac{2}{3}$, of caudal $5\frac{1}{4}$, height of body $3\frac{2}{3}$ in the total length. *Eyes*—diameter $4\frac{1}{2}$ in length of head, 1 to $1\frac{1}{2}$ diameters from end of snout, and 1 apart. Greatest width of head equals 1/2 its length, and its height equals its length excluding the snout. The maxilla reaches to below the first third of the eye. Preopercle slightly crenulated at its angle: four rows of scales between the eye and angle of the preopercle. *Teeth*—in a

blackish with white spots, and a large blue ocellus, having a circular white edge extending from the fourth to the ninth dorsal spines. Anal black, with a white base. Caudal light in two specimens, dark in the third. They are from $4\frac{1}{2}$ to 5 inches in length. Jerdon, from his remarks, evidently considered that this is merely a variation in the colours of *O. Sonneratii*=*O. nigromarginatus*; Dr. Günther considers it "a very different species."

single row laterally in either jaw, anteriorly an enlarged outer row in the premaxillaries, and two large canines in the mandibles: a little obtuse on vomer: with rounded crowns on palatines. *Fins*—dorsal spines short, third the longest, and about half as high as the first ray, the first 11 to 15 of which are unbranched: the end of the fin rather pointed. Pectoral as long as the head excluding the snout, ventral slightly longer. Caudal rounded. *Scales*—finely ctenoid. *Colours*—of a dull olive, the upper half of the soft dorsal with numerous yellow spots, the outer half of anal with brown ones. Caudal yellow in its last half, its base with brown spots between the rays.

This species appears to be closely allied to if not identical with *Pseudochromis fuscus*, Mull. and Trosch. Hor. Ich. 1849, p. 23, t. iv, f. 2, but the base of the pectoral is said to be black, and the dorsal and anal spots blue-streaks. None appear to exist on the caudal fin. The height of the body and length of head are given at 1/4 each of the total, and the snout is less than the diameter of the eye.

Black finned variety, D $\frac{3}{24}$, A. $\frac{3}{15}$, L. l. 41. Dorsal and anal fins black edged, last half of caudal black.

Pseudochromis adustus, Mull. and Trosch. Hor. Ich. iii, p. 23, t. iv, f. 2, differs in that most of its dorsal rays are said to be branched, if such can be considered a sufficient reason for constituting a species. In some specimens a few or even a single ray is here and there divided, but it does not appear to me that any strict rule exists.*

Habitat.—Andaman islands where it is not rare, to perhaps the Philippines: the specimen figured (life-size) is from the former locality.

* I gave the British Museum specimens from the Andamans, they are labelled *P. adustus*.

FAMILY, XXIII—BATRACHIDÆ, *Swainson.*

Pediculati, pt., Cuv.

Branchiostegals six: pseudobranchiæ present. Body low and more or less elongated: head large: the muciferous system well developed. Gills three. The gill-openings narrow, in the form of a slit before the pectoral fin. Opercles armed. Teeth conical, and of moderate size or small. First dorsal with few spines: the second and the anal with many rays: ventral with two rays, jugular: pectorals not pediculated. Scales, when present, small. Air-vessel present.

Swainson formed the Family BATRACHIDÆ (Fishes, ii, p. 282), or "Blenny Bullheads," as he termed them, in 1839.

Geographical distribution.—Coasts of tropical and temperate regions.

These carnivorous fishes apparently delight in mud and dirty water, they frequent the shores ascending tidal rivers and estuaries. Dr. Cantor observes that at Pinang "the natives attribute poisonous qualities to these fishes, and reject them even as manure," Catal. p. 206. They are, however, eaten at Bombay by the poorer classes. Dr. Günther observes in the Zool. Record (1864, p. 155). "Dr. Günther has described a second species of this Genus (*Thalassophryne* belonging to this family) *Th. reticulatus* from the Pacific coast of Panama (Proc. Zool. Soc. 1864, p. 150). On examining this fish, he discovered a most singular apparatus which structurally is as perfect a poison-organ as that of the venomous serpents. Each operculum terminates in a long spine similar to the two dorsal spines: each spine is perforated at the extremity and at the base, and has a canal in its interior. The canal leads to a sac at the base of each spine, in which a considerable quantity of the poisonous substance was found: on the slightest pressure it flowed freely from the opening of the spine. The sacs are not the secretory organs, but merely the reservoirs in which the fluid secreted accumulates. The author believes he has found evidence that the real organ of secretion is the system of muciferous channels, or at least some portion of it." Captain Dow remarks (Proc. Zool. Soc. 1865, p. 667), "The natives seemed quite familiar with the existence of the spines, and of the emission from them of a poison, which, when introduced into a wound, caused fever; but in no case was a wound caused by one of them known to result seriously. The slightest pressure of the finger at the base of the spine caused the poison to jet a foot or more from the opening of the spine."

SYNOPSIS OF INDIVIDUAL GENUS.

1. *Batrachus*, as defined.

Genus, 1—BATRACHUS, *Bl. Schn.*

Branchiostegals six. Body anteriorly somewhat cylindrical, and posteriorly compressed: head broad, depressed. Gill-openings narrow. Eyes lateral. Gape of mouth wide. Gill covers with several spines. Teeth on jaw, vomer, and palate. No distinct canines. First dorsal with three strong spines. Scales, if present, very minute. Air-vessel divided into two lateral parts. Pyloric appendages absent. Vertebræ $\frac{10}{17}$-$\frac{12}{27}$.

Cantor observes that these fishes live some period after removal from the water.

SYNOPSIS OF SPECIES.

1. *Batrachus grunniens*, D. 3 | 20-22, A. 15-18. Four, occasionally only three, opercular spines. A foramen in the axilla. Brown, marbled. Seas of India to the Malay Archipelago.

2. *Batrachus Gangene*, D. 3 | 20-22, A. 16-18. Four opercular spines. No foramen in axilla. Reddish-brown, marbled. Estuaries of the Ganges and large Burmese rivers.

1. Batrachus grunniens, Plate LIX, fig. 1.

Cottus grunniens, Var. B. Linn. Mus. Ad. Fr. ii, p. 65, and Syst. p. 1209.

Cottus grunniens, Bloch, t. 179; Lacép. iii, p. 232; Shaw, Zool. iv, p. 256.

Batrachus grunniens, Bl. Schn. p. 43; Cuv. Règ. Anim.; Cuv. and Val. xii, p. 466; Cantor, Catal. p. 205; Bleeker, Riouw. p. 487; Peters, Monats. Ak. Wiss. Berlin, 1868, p. 270; Steind. Ak. Wien, ix, 1870, p. 564.

Batrachus trispinosus, Günther, Catal. iii, p. 169; Day, Fish. Malabar, p. 120; Kner, Novara Fische, p. 189.

Batrachus Dussumieri, Jerdon, M. J. L. and Sc. 1851, p. 144; ? Cuv. and Val. xii, p. 474, pl. 367.

B. vi, D. 3 | 20-22, P. 21, V. 1/2, A. 15-18, C. 15.

Length of head $3\frac{1}{2}$, of caudal $5\frac{1}{2}$, height of body 5 in the total length. *Eyes*—diameter 1/5 of length of head, nearly 1 diameter from end of snout, and $1\frac{1}{4}$ apart. Head depressed, its greatest width equals

its length behind the middle of the eyes. Gill covers with four backwardly directed spines, two on the opercle and two on the subopercle, the inferior of these last being often indistinct (*B. trispinosus*), sometimes only two spines are visible on the opercles. Snout broad and depressed, surrounded by a wreath of tentacles, those above the orbit very distinct. The maxilla extends to below the posterior margin of the orbit. A round foramen in the upper part of the axilla. *Teeth*—in several sharp, pointed rows in both jaws, becoming a single row laterally, also present in one or two rows on vomer and in a single row on palatines. *Fins*—first dorsal triangular, spines moderately strong, the second the longest: caudal wedge-shaped. *Air-vessel*—in two rounded lateral portions, connected across the body of the vertebra. *Colours*—yellowish, marbled with darker.

B. Dussumieri, C. V., may be a distinct species, known by having narrow bands of villiform teeth on the palatines.

Habitat.—Seas of India (most numerous along the Malabar coast) to the Malay Archipelago. The specimen figured is 7½ inches in length.

2. Batrachus Gangene, Plate LX, fig. 1.

Batrachoides Gangene, Ham. Buch. Fish. Ganges, pp. 34, 365, pl. 14, f. 8.

Batrachus grunniens, Günther,* Catal. iii, p. 168 (not Bl. Schn.); Day, Fishes of Malabar, p. 119.

B. vi, D. 3 | 20-22, P. 21, V. 1/2, A. 16-18, C. 15.

Length of head 3⅓, of caudal 7½ to 8, height of body 4 to 4½ in the total length. *Eyes*—diameter 1/7 to 1/8 of length of head, 3 diameters from end of snout, and 3½ apart. Head broad, depressed, its greatest width nearly equal to its length. Maxilla reaches to below the hind edge of the orbit. Four backwardly directed spines on the gill-covers, two being on the opercle, and the other two on the subopercle. Snout broad, depressed, surrounded by tentacles which are most distinct along the edge of the mandibles, some are also round the eye, and numerous fine ones over the surface of the head. No foramen in axilla. *Teeth*—two or more rows of teeth in the centre of either jaw, a single row laterally, those in the mandibles the largest and directed a little inwards: two rows of teeth on vomer: a single one on palatines. *Fins*—as in the last species. *Colours*—light reddish-brown, marbled with darker.

Hamilton Buchanan observes that this fish "is found in the salt-water estuaries of the Ganges, is an ugly animal, does not exceed a span in length, and when frightened emits a remarkable creaking noise."

Habitat.—Estuaries of the Ganges and other large Indian and Burmese rivers; attaining at least a foot in length. The specimen figured is from Calcutta.

* See note on dentition of palate, Günther, An. and Mag. 1872, ix, p. 439.

FAMILY, XXIV—PEDICULATI, *Cuv.*

Branchiostegals five or six: pseudobranchiæ absent. Skeleton fibro-osseus. Head and anterior portion of the body large, the former depressed or compressed. Gills two and a half or three and a half: gill-opening reduced to a small foramen, situated in or near the axilla. Eyes superior or lateral. Teeth minute, villiform, or cardiform. The spinous dorsal, when present, composed of a few isolated spines: the carpal bones prolonged, forming a sort of arm for the pectoral fin: ventrals, when present, jugular, with four or five soft rays. Skin smooth, or covered with small spines or tubercles. Air-vessel present or absent. Pyloric appendages few or absent.

Bleeker agrees with Gill in considering the LOPHIOIDEI, CHIRONECTEOIDEI, and MALTHEOIDEI as forming distinct families. *Antennarius* belonging to the CHIRONECTEOIDEI, and *Halieutæa* to the MALTHEOIDEI.

SYNOPSIS OF GENERA.

1. *Antennarius.* Head and body compressed. Teeth on palate. Gills lateral. Three isolated dorsal spines, the anterior of which may be rudimentary or absent. Air-vessel present. Seas of tropical regions.

2. *Halieutæa.* Head and body strongly compressed. No teeth on palate. Gills on upper surface of body. No air-vessel. Seas of India to the Malay Archipelago and beyond.

Genus, 1—ANTENNARIUS, *(Comm.) Cuv.*

Chironectes, pt. Cuv.

Head large, elevated, and compressed. Only one half of the anterior branchial arch provided with lamellæ. Cleft of mouth nearly vertical. Eyes lateral. Gill-openings lateral. Cardiform teeth in the jaws and palate. The spinous dorsal in the form of three isolated spines, the anterior of which, situated upon the snout, is modified into a tentacle: the second dorsal of moderate length: anal short. Body smooth, granulated, or covered with minute spines, and sometimes with cutaneous tentacles. Air-vessel large and simple. Pyloric appendages absent.

These fishes, due to their mode of progression, have a wide geographical range. Their pediculated pectoral fins allow them to walk or hop over moist ground, or slimy rocks in quest of their prey, and even clasp pieces of wood or seaweeds, attached to which they often become carried away from the shore by currents, and are sometimes observed far out at sea. Although bad swimmers, M. Dussumier observes that they inflate themselves and float on the water like a *Diodon*. Sir Emerson Tennent gives a figure of *A. nummifer*, from Ceylon, and observes that it belongs to the Family of "Anglers" which conceal themselves in the mud, displaying only the erectile first ray, situated on the head, and which bears an excrescence on its extremity resembling a worm or piece of meat. By agitating this, smaller fishes are attracted and fall a prey to the artful angler.

These fishes, owing to the diversities of colour in the same species, to the change of the form of spines on the body with age, and to the abnormal increase or decrease in the number of rays are difficult to discriminate one from another. The *A. nummifer*, for instance, has P. 13 in Madras specimens. I have examined some in the British Museum and find the following: in one from Aden $6\frac{1}{2}$ inches long P. 12: in one from N.W. coast of Africa P. 11: one from St. Helena P. 10: in others from the Malay Archipelago and China P. 10: at once showing that such variations should not be admitted in constituting species.

SYNOPSIS OF SPECIES.*

1. *Antennarius hispidus*, D. 3 | 12, P. 10, A. 7. Skin rough. Yellow, with brown spots and streaks radiating from the eye and over the body and fins. Seas of India to the Malay Archipelago and beyond.

2. *Antennarius nummifer*, D. 3 | 12, P. 10-13, A. 7. Skin rough. Grayish-brown, with a black ocellus on the side, another at base of middle of dorsal fin. Fins spotted. East coast of Africa, seas of India to the Malay Archipelago and beyond.

3. *Antennarius marmoratus*, D. 3 | 12, P. 10, A. 7. Skin smooth, but with fleshy excrescences. Colours various. Red Sea, East coast of Africa, seas of India, to the Malay Archipelago and beyond.

1. Antennarius hispidus, Plate LX, fig. 2.

Lophius hispidus, Bl. Schn. p. 142.
Lophius histrio, Russell, Fish. Vizag. i, p. 12, and *Kappa mura moia*, pl. xix.
Chironectes lophotes, Cuv. Mém. Mus. iii, p. 428, t. xvii, f. 2.
Chironectes hispidus, Cuv. and Val. xii, p. 407.

* Dr. Günther's list of Ceylon Fishes in Sir Emerson Tennent's Nat. Hist. of Ceylon, p. 361, includes, besides those named below, *A. pinniceps*, *A. Commersonii*, *A. multiocellatus*, and *A. bigibbus*, but *A. nummifer* is not included unless as *A. multiocellatus*.

Antennarius hispidus, Cantor, Catal. p. 203; Bleeker, Moluk. p. 280, and Atl. Ich. v, p. 14, t. cxciv, f. 2, and cxcviii, f. 1; Günther, Catal. ii, p. 189.

B. vi, D. 3 | 12, P. 10, V. 5, A. 7, C. 9.

Mouth subvertical, lower jaw a little compressed, the width of the gape of the mouth exceeding that of the cleft. *Eyes*—high up, from 2 to $2\frac{1}{2}$ diameters from end of snout. *Teeth*—cardiform in both jaws and on the palatines. *Fins*—first dorsal spine about as long as the second, and ending in fleshy knob, second about as long as the third, and each with a skinny flap posteriorly, that from the third nearly or quite joining the second dorsal fin, the last three rays of which latter fin are branched. Pectoral and ventral rays unbranched. Last six anal rays branched, as are also those of the caudal. *Scales*—skin universally roughened, with spinate points extending over the fins, except some of the rays of the pectoral, ventral, and caudal. *Lateral-line*—ceases below middle of second dorsal. *Colours*—yellow, with brown spots and streaks, some radiating from the eye, others descending from the back and many down the sides. Small ones and blotches or spots on the fins.

Habitat.—Seas of India to the Malay Archipelago and beyond.

2. Antennarius nummifer, Plate LIX, fig. 2.

Chironectes nummifer, Cuv. Mém. Mus. iii. p. 430, pl. xvii, fig. 4; Cuv. and Val. xii, p. 425; Rüpp. N. W. Fische, p. 141.

? *Chironectes chlorostigma*, (Ehrenb.) Cuv. and Val. xii, p. 421.

Antennarius nummifer, Günther, Catal. iii, p. 195; Day, Fish. Malabar, p. 121; Bleeker, Atl. Ich. v, p. 18, t. 198, f. 2; Klunz. Verh. z. b. Ges. Wien, 1871, p. 499.

B. vi, D. 3 | 12, P. 10-13, V. 5, A. 7, C. 9.

Mouth almost vertical, with the lower jaw compressed towards its extremity, the width of the gape equalling the extent of the cleft. Length of lower jaw equals the length of the third spine of the dorsal fin. *Eye*—high up, but little more than 1 diameter from end of snout. *Teeth*—cardiform in both jaws and on the palatines. *Fins*—first dorsal spine not quite so long as the second, and ending in a fringed extremity, second rather above 1/2 as long as third, which latter has a flap of skin posteriorly, which does not extend so far as to the base of the second dorsal, the last two rays of which are divided at their outer extremities. Pectoral with 13 unbranched rays. Ventral with five unbranched rays. Anal, commencing under middle of second dorsal, has branched rays, its last just reaches the base of the caudal. Caudal rounded, its rays branched: last dorsal rays just reach the base of the caudal fin. *Scales*—skin universally roughened, with points extending over fins except some of the rays of the pectoral, ventral, and caudal. *Lateral-line*—ceases below the commencement of the second dorsal. *Colours*—grayish-brown, having a purplish tinge: a black ocellus having a yellow edge behind and above the end of the base of the pectoral fin. Fins yellow, the dorsal with a black yellow-edged ocellus below its seventh and eighth rays, its end with black bands and spots, as have also the pectoral, ventral, caudal, and anal fins. Tongue whitish, with green marks: eyes golden.

Bleeker, also Günther in Catal. ii, p. 195, give P. 10 to this species. Playfair, in the "Fishes of Zanzibar," states 12. I find 13 in the Madras species, this variation has already been referred to (p. 271).

Habitat.—Red Sea, East coast of Africa, seas of India to the Malay Archipelago and beyond. Grows to at least $6\frac{1}{2}$ inches in length. The one figured (life-size) is from Madras.

3. Antennarius marmoratus.

Lophius histrio, var. *marmoratus*, Bl. Schn. p. 142.

Chironectes lævigatus, Cuv. Mém. Mus. iii, p. 423, pl. xvi, f. 1; Cuv. and Val. xii, p. 399.

Lophius geographicus, Quoy and Gaim. Voy. Uranie, i, p. 355, pl. 65, f. 3.

Chironectes marmoratus, Less. Voy. Coq. Zool. ii, p. 145, Poiss. pl. xvi, f. 2; Cuv. and Val. xii, p. 402; Tem. and Schleg. Fauna Japon. Poissons, p. 159, pl. 81, f. 1.

Chironectes pictus, Cuv. and Val. xii, p. 393, pl. 364.

Chironectes tumidus, Cuv. and Val. xii, p. 397.

Chironectes nesogallicus, Cuv. and Val. xii, p. 401.

Antennarius nitidus, Bennett, Zool. Journ. iii, p. 375, t. ix, f. 2.

Chironectes pictus, var. *vittatus*, Richards. Voy. Ereb. and Terr. Fishes, p. 15, pl. ix, f. 3, 4.

Lophius histrio, Gronov. ed. Gray, p. 48 (not syn.).

Antennarius marmoratus, Günther, Catal. iii, p. 185; Day, Fish. Malabar, p. 121; Bleeker, Atl. Ich. v, p. 23, t. 198, f. 4, t. 199, fig. 1 (see synonyms); Kner, Novara Fische, p. 192.

B. vi, D. 3 | 12, P. 9-10, V. 5, C. 9, A. 7, Vert. 9/9.

The variations in this species due to age or locality are so considerable that two specimens are very rarely found possessing complete similarity. *Eyes*—about 1 diameter from end of snout. The skin may be smooth, minutely or distinctly granulated, whilst the length of the third dorsal spine varies from one-half to less than one-third of the height of the body. The anterior dorsal spine is short, slender, and terminating in a small knob having a minute tentacle attached to it, sometimes it is very short, or it may be entirely absent, the second and third spines are fringed on their summits. The last two dorsal rays branched, the last if laid backwards extends to or slightly beyond the root of the caudal. Skin usually smooth or sometimes granular, rarely rough. Head and body with cutaneous tentacles, those at the angle of the mouth and on the abdomen being the largest. Stomach a large sac. *Air-vessel*—large and simple. *Colours*—

vary, generally reddish-yellow marbled with brown, and brown spots mostly edged with white, radiating from the eye. Round white spots on sides, and on abdomen. In some the fins are banded. Iris golden, with radiating brown lines.

Habitat.—Red Sea, East coast of Africa, through the seas of India to the Malay Archipelago and beyond.

Genus, 2—HALIEUTÆA, *Cuv. and Val.*

Astrocanthus, Swainson.

Branchiostegals six. Body and head depressed, the latter very large and broad, anteriorly forming the arc of a circle. Eyes antero-lateral. Cleft of mouth horizontal, rather wide, with the upper jaw rather protractile. A transverse bony ridge across snout, beneath which is a retractile tentacle. Gill opening near the axilla on the upper surface of the body. Gills two and a half: the anterior branchial arch destitute of laminæ, small teeth on jaws and tongue, palate edentulous. A short dorsal and also anal fin: fin rays unbranched. Body and head covered with small spines. Air-vessel and pyloric appendages absent.

"The union of the interopercle with the preorbital" is said by Dr. Günther to be "very singular, and unique in this order of fishes. A little before the suture between the inter- and sub- opercle the preopercle is joined to the former; it is the smallest of all the opercular pieces, and its limbs meet at a somewhat acute angle." (Catal. iii, p. 204.)

Bleeker found that the intestinal tract was much longer than the fish, and contained the remains of shells. (*Verh. Acad. Wetensch. Amsterdam*, i, *Japan*, p. 10.)

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Halieutæa stellata*, D. 4, A. 4. Superiorly and laterally covered with spines. Pinkish. Seas of India to the Malay Archipelago and beyond.

1. Halieutæa stellata, Plate LIV, fig. 1.

Lophius stellatus, Wahl. Skr. Nat. Kjöb. iv, p. 214, t. iii, fig. 3, 4; Bl. Schn. p. 142.

Lophius faujas, Lacép. i, p. 318, t. xi, fig. 2, 3.

Lophius muricatus, Shaw, Zool. v, p. 382, pl. 162.

Halieutæa stellata, Cuv. and Val. xii, p. 456, pl. 366; Temm. and Schlegel, Fauna Japon. Poissons, p. 160, pl. 72; Jerdon, M. J. L. and Sc. 1851, p. 150; Bleeker, Japan, p. 10, and Atl. Ich. vi, p. 4, t. 198, f. 3, and 200, f. 2; Günther, Catal. iii, p. 203.

Astrocanthus stellatus, Swainson, Fishes, ii, p. 331, fig. 108.

B. vi, D. 4, P. 13, V. 1/5, A. 4, C. 9, Vert. 7/10.

Eyes—lateral, with the interorbital space rather concave. A retractile tentacle at snout above the mouth and which has a trefoil extremity. Gill openings above the axilla in about the middle of the total length. *Fins*—dorsal fin situated in the third fifth of the total length, and slightly behind the pectorals. All the fin rays unbranched. *Scales*—body covered with rather distantly placed spines, each of which as a rule, has four or more roots, the lateral spines are the largest, and in the anterior half of the body have three or even four points at their outer edges. *Colours*—pinkish.

Jerdon observes that he only procured two specimens of this fish whilst in Madras. Whilst I was there it was by no means rare, but not attaining the size at which Bleeker has taken it in the Malay Archipelago.

Habitat.—Seas of India to the Malay Archipelago and beyond; it attains at least 8 inches in length. The one figured (life-size) is from Madras.

Family, XXV—COTTIDÆ,* *Günther.*

Platicephalinæ (Sub. Fam.) Swainson.

Branchiostegals five to seven: pseudobranchiæ. Body oblong, compressed, or subcylindrical. Eyes lateral or partly directed upwards and outwards. Cleft of mouth lateral. Some of the bones of the head armed. Infraorbital bones articulate with the preopercle. Teeth villiform, no canines. Two separate dorsal fins or in two distinct portions, the spinous less developed than the soft or than the anal: ventrals thoracic, sometimes scarcely developed. Air-vessel generally absent. Pyloric appendages few, or in moderate numbers.

SYNOPSIS OF GENERA.

1. *Platycephalus*, as defined.

Genus, 1—Platycephalus,† *Bl. Schn.*

Flat heads, or *Crocodile Fishes.*

Branchiostegals seven: pseudobranchiæ. Head broad, depressed, and armed with spines. Lower jaw the longer. Eyes lateral or superior. Villiform teeth in the jaws, vomer, and palatines, with larger ones sometimes intermixed. Two dorsal fins, the first having a small isolated spine anterior to it: the soft portion similar to the anal: ventrals thoracic: no pectoral appendage. Scales present, ctenoid, small or rather so. Lateral-line complete, in some species armed with spines. Air-vessel absent. Pyloric appendages in moderate numbers.

These fishes are termed "Crocodile fishes" in Malabar, and wounds from their spines are dreaded because of the violent irritation they occasion. Immediately on being captured they are knocked on the head.

Their eyes are peculiar, in that the iris possesses two semicircular flaps, one above, the other below, the upper being usually the larger, they can be brought close one to the other, probably due to the stimulus of light.

The comparative width of the head to its length differs in individuals, also with age, becoming broader in the adult. In *P. insidiator* at $5\frac{1}{2}$ and $6\frac{3}{4}$ inches the width of the head between the inner edges of the preopercular spines equals its length behind the eyes; at $14\frac{1}{2}$ inches it equals that of the head excluding the snout.

I have captured specimens full of well developed ova as early as February. These fishes are eaten by the lower classes of natives.

The subdivision of this genus into those having (1) two spines, or those (2) with more than two spines at the angle of the preopercle is open to this objection, some count the small one usually present at the base of the large spine, others consider it as forming the end of the spinate ridge. I have therefore thought it better to follow the division of whether the lateral-line is spined or smooth.

SYNOPSIS OF SPECIES.

A. *Lateral-line armed with spines.*

1. *Platycephalus scaber*, D. 1 | 7-8 | 12, A. 12, L. r. 105. Spines 55. Ridges on head spined. Largest preopercular spine if laid forwards would reach 1/2 way to orbit. Brownish. Seas of India to the Malay Archipelago.

2. *Platycephalus tuberculatus*, D. 1 | 7-8 | 11-12, A. 11-12, L. l. 53-55, having 15 to 20 spines in its first third. Ridges on head spined or serrated. Largest preopercular spine if laid forwards would reach 1/2 way to orbit. Brownish, with vertical bands. Seas of India.

* This family is not identical with the sub-Family *Cottini* of Dr. Sauvage (N. Arch. Mus. 1873, see p. 148 ante) who has divided the Family Triglides into the following groups:

I. Scorpænidæ. Dentition feeble, teeth villiform without canines. Infraorbital bones articulated moveably with the preopercle, never entirely covering the cheeks. Nasal bones small and free. Skin scaleless or scaled, sometimes spiny, never cuirassed. Ventrals thoracic, supported by a long pelvic bone, the two bones being in contact and fused together.
   a. *Scorpæni*:—as *Sebastes, Scorpæna, Pterois, Tænianotus*, and group of *Apistes*.
   b. *Cottini*:—as *Hemitripterus, Synancidium, Synanceia, Minous, Pelor*, group of *Cottes, Icelus, Triglops, Polycaulus, Hemilepidotus*.

II. Platycephalidæ. Head flattened and as if crushed. Body anteriorly depressed. Dentition feeble, no canines. Two dorsals: ventrals thoracic and widely separated. Pelvic bones wide asunder.
   a. *Platycephalus*.

III. Triglidæ. Infraorbital bones articulated in an almost immoveable manner with the preopercle and covering the entire cheek. Nasals soldered into a great plate and almost covering the snout. Ventrals thoracic and in contact.
   a. *Triglini*:—(1) body covered with ordinary scales, as *Trigla, Lepidotrigla, Prianotus, Bembras*.
   (2) body having scales and plates, as *Hoplichthys*.
   b. *Cataphracti*:—(1) an interparietal, as *Dactylopterus. Cephalacanthus*.
   (2) no interparietal, as *Agonus, Agonomalus, Peristhedion*.

† *Ulu parti*, Tam.

3. *Platycephalus macracanthus*, D. 1 | 8 | 12, A. 12, L. l. 75, having 15 spines. Ridges on head spined or serrated. Largest preopercular spine if laid forwards would reach orbit. Brownish. Seas of India to Amboina.

B. *Lateral-line smooth.*

4. *Platycephalus insidiator*, D. 1 | 7 | 13, A. 13, L. l. 120. Ridges on head slightly spined. Two large spines at angle of preopercle. Brownish, caudal yellow with oblique black bands. Red Sea, seas of India to the Malay Archipelago and beyond.

5. *Platycephalus punctatus*, D. 1 | 8 | 12, A. 11-12, L. l. 110. Ridges on head spinate. Largest preopercular spine about 1/7 of length of head. Brown, banded and with black spots. Seas of India to Malay Archipelago.

6. *Platycephalus serratus*, D. 1 | 8 | 11-12, A. 11. Ridges on head serrated not spinate. Brownish, with vertical bands. Trincomalee.

7. *Platycephalus carbunculus*, D. 1 | 8 | 11-12, A. 11-12, L. l. 75-80. Brownish spotted. Seas of India to the Malay Archipelago.

A. *Lateral-line armed with spines.*

1. Platycephalus scaber, Plate LX, fig. 4.

Cottus scaber, Linn. Mus. Ad. Fred. ii, p. 66, and Syst. Nat. i, p. 451; Bloch, t. clxxx; Gmel. Linn. p. 1209.

Platycephalus scaber, Bl. Schn. p. 58; Cuv. and Val. iv, p. 249; Bleeker, Sclerop. p. 6; Jerdon, M. J. L. and Sc. 1851, p. 142; (Günther, Catal. ii, p. 187, not syn.); Kner, Novara Fische, p. 123; Peters, Monats. Akad. Berlin, 1868, p. 258; Sauvage, Mém. Mus. 1874, p. 59.

Callionymus, Russell, Fish. Vizag. i, p. 37, and *Irrwa*, fig. xlvii.

Platycephalus vittatus, Cuv. and Val. ix, p. 462.

Platycephalus neglectus, Trosch. Wiegm. Arch. 1840, p. 187; Günther, Catal. ii, p. 187.

Vet-ool-pa-thy, Tam.

B. vi, D. 1 | 7-8 | 12, P. 21, V. 1/5, A. 12, C. 15, L. r. 105. Spines 55.

Length of head $3\frac{1}{2}$ to $3\frac{3}{4}$, of pectoral $7\frac{1}{2}$ to 8, of caudal 8, height of body 8 in the total length. *Eyes*—diameter $4\frac{1}{2}$ to $5\frac{1}{4}$ in length of head, $1\frac{1}{4}$ to $1\frac{1}{2}$ diameters from end of snout, and 2/3 of a diameter apart. Interorbital space concave. Greatest width of head equals $1\frac{3}{4}$ in its length, and its height equals 1/3 of its length. The maxilla extends to under the anterior 1/3 of the orbit: a sharp spine at the anterior superior edge of the orbit. Supraorbital margin serrated, and from it a spinate ridge goes to the occiput. A similar ridge passes from the hind edge of the eye to the shoulder: a third spiny ridge extends from the preorbital to the angle of the preopercle where there are two spines, the upper if laid forwards reaching 1/2 or 2/3 of the distance to the orbit, it has a third short spine anteriorly at its base. In a specimen 5 inches long the preopercular spine if laid forwards would reach as far as the orbit. No spines at nostrils, but in some specimens on the median ridge, opposite the nostrils are two small ones. Two opercular spines. *Teeth*—small in jaws, in two oval parallel patches, about as long as the diameter of the eye on the vomer: in an elongated band on either palatine. *Fins*—second dorsal spine equals $2\frac{2}{3}$ to 3 in the length of the head, and is not quite so high as the two next, second dorsal of about the same height as the first. Ventral nearly reaches the anal which commences slightly behind the vertical from that of the first dorsal ray. Caudal cut nearly square. *Scales*—from 4 to 5 rows between the lateral-line and base of first dorsal fin, each of those on the cheeks is furnished with a small spinate point, which in old individuals is occasionally subdivided into several as if serrated. *Lateral-line*—with about 55 rather strong spines directed backwards, and extending along its entire length, one being on every alternate scale. *Colours*—brownish, becoming dull white beneath, more or less distinct vertical bands pass from the back to the sides. First dorsal clouded with black, second dorsal spotted. Pectoral and ventral usually dark externally. Caudal grayish in its last half.

Platycephalus scaber, Günther=*P. rodericensis*, C. V. iv, p. 253. It is said of *P. punctatus*, C. V. (iv, p. 245) this species makes a sort of transition to the *scaber*: but it has not like the *scaber* the lateral-line spiny.

Habitat.—Seas of India to the Malay Archipelago and beyond. The specimen figured (7 inches long) is from Madras where it is common.

2. Platycephalus tuberculatus, Plate LX, fig. 5.

Cuv. and Val. iv, p. 258; Günther, Catal. ii, p. 186.

B. vi, D. 1 | 7-8 | 11-12, P. 21, V. 1/5, A. 11-12, C. 15, L. l. 53-55.

Length of head 1/3 to 4/13, of pectoral 1/8, of caudal 1/7, height of body 1/6 in the total length. *Eyes*—directed upwards and somewhat outwards, diameter $3\frac{2}{3}$ to 4 in the length of head, $1\frac{1}{4}$ to $1\frac{1}{2}$ diameters from end of snout, and 1/4 of a diameter apart. Interorbital space concave. Width of head between the preopercular spines equals $1\frac{1}{4}$ in its length. The maxilla extends to below the front quarter of the eye. Supraorbital margin serrated, and having two sharp spines anteriorly, from it posteriorly passes a serrated ridge towards the occiput, whilst a second goes from behind the eye to the upper opercular spine: a third

serrated ridge passes from the preorbital to the angle of the preopercle. A few spines in the median line midway between eye and snout: a spinate ridge passes forwards from them on either side above the limbs of the premaxillaries. A serrated bony ridge goes across the opercle to a strong spine at the middle of its hind edge. Angle of preopercle with a strong spine which equals half the distance between its base and the orbit. This spine has one superiorly at its base at the end of the serrated ridge, and another a little longer inferiorly, and situated on the lower margin of the preopercle, which contains from 2 to 4 more decreasing in size anteriorly and all pointing backwards. The number and size of these lower spines varies. Several spines at the shoulder, and a strong one above the axilla. *Teeth*—villiform in jaws, in two oval parallel patches on the vomer, and in an elongated band on the palatines. *Fins*—second dorsal spine $2\frac{1}{4}$ in length of head, and not quite so high as the third, soft dorsal as high as the spinous. Ventral nearly reaches the anal, which last arises below the second dorsal: caudal slightly rounded. *Scales*—from 4 to 5 rows between the lateral-line and base of first dorsal fin: most of those on the cheeks have a rudimentary spine. *Lateral-line*—with from 15 to 20 spines in the first third of its course. *Colours*—brown, becoming lighter beneath, vertical bands pass from the back to the sides. First dorsal blackish brown: second dorsal spotted. Pectoral with brown spots in its upper two-thirds, and a black margin with a white edge along its lower border: outer half of ventrals gray.

The objection to considering this Cuv. and Val. fish is that it is observed that the lateral-line is nearly as spinate as in *P. scaber*. It is identical with the species thus named in the British Museum. *P. spinosus* according to a communication from Dr. Hubrecht has from 36 to 38 scales along the lateral-line.

Habitat.—Seas of India.

3. Platycephalus macracanthus, Plate LIX, fig. 3.

Bleeker, Versl. and Meded. Ak. Wet. Amsterd. 1867, p. 7, *c* fig.

B. vii, D. 1 | 8 | 12, P. 23, V. 1/5, A. 12, C. 13, L. l. $\frac{75}{65}$, L. tr. 4/15, Spines 15.

Length of head $3\frac{1}{3}$, of caudal $7\frac{1}{2}$, height of body $7\frac{1}{2}$ in the total length. *Eyes*—diameter $4\frac{3}{4}$ in length of head, $1\frac{1}{2}$ diameters from end of snout, and about 1/2 a diameter apart. Interorbital space concave. Width of head between the preopercular spines equal to about 1/2 its length. Lower jaw the longer: the maxilla extends to below the first third of the eye. Supraorbital margin with six strong denticulations, and the ridge from it to occiput with about five more: ridge from eye to shoulder with about five spines: the one from preorbital to preopercular spine with six, (besides being serrated), its lower edge serrated. A small spine internal to the front nostril which is furnished with a cirrus. Spine at angle of preopercle reaching to the base of the pectoral, and having a short one inferiorly succeeded by another still more minute. *Teeth*—villiform in two parallel patches on vomer, and in a narrow band along either palatines. *Fins*—second dorsal spine $2\frac{1}{4}$ in length of head, and nearly as high as the commencement of the second dorsal. Pectoral $2\frac{1}{4}$ in length of head, ventral slightly longer. Anal commences below second ray of dorsal: caudal cut square. *Scales*—those on the head not spinate. *Lateral-line*—with about 15 small spines in the first portion of its course. *Colours*—brownish above, becoming dull white beneath, first dorsal and end of caudal darkish, second dorsal with brown spots on the rays.

Habitat.—Madras, Amboina. The specimen figured (life-size) is from Madras.

B. *Lateral-line smooth.*

4. Platycephalus insidiator.

Cottus insidiator, Forsk. p. 25; Gmel. Linn. 1213; Shaw, Zool. iv, p. 260.

Callionymus Indicus, Gmel. Linn. p. 1153; Russell, Fish. Vizag. ii, p. 36, and *Irrwa*, pl. xlvi.

Cottus spatula, Bl. t. 424.

Platycephalus insidiator, Bl. Schn. p. 59; Cuv. and Val. iv, p. 227; Rüpp. N. W. Fische, p. 102; Bleeker, Sclerop. p. 6; Temm. and Schleg. Fauna Japon. Poiss. p. 39, pl. 15, f. 1; Cantor, Catal. p. 37; Richards. Ich. China, p. 216; Jerdon, M. J. L. and Sc. 1851, p. 142; Günther, Catal. ii, p. 177; Day, Fishes of Malabar, p. 43; Kner, Novara Fische, p. 121; Klunz. Verh. z. b. Ges. Wien, 1870, p. 815.

Batrachus Indicus, Bl. Schn, p. 43.

Platycephalus spatula, Bl. Schn. p. 59.

Calliomorus Indicus, Lacép. ii, p. 343.

Cottus Madagascariensis, Lacép. iii, p. 248, t. xi, f. 12; Shaw, Zool. iv, p. 261, pl. 37.

Calliomorus chaca, Ham. Buch. pp. 133, 373.

Platycephalus endrachtensis, Quoy and Gaim. Voy. Freyc. Zool. p. 353; Cuv. and Val. iv, p. 240.

? *Platycephalus cultellatus*, Richards. Ich. China, p. 217.

Platycephalus chacca, Gray and Hard. Ind. Zool. ii, pl. 93, f. 2.

Irrwa, Tel.: *Ool-pa-thy*, Tam.: *Nga-paying-ki*, Mngh.: *A-ra-wud-dah* or *Chou-ur-dah*, And.

B. vii, D. 1 | 7 | 13, P. 17, V. 1/5, A. 13, C. 15, L. r. $\frac{120-125}{100-120}$, L. tr. 12/24, Cæc. Pyl. 14, Vert. 12/15.

Length of head $3\frac{2}{3}$, of caudal 7, height of body 7 in the total length. *Eyes*—superior, diameter $6\frac{3}{4}$ to 7 in length of head, $1\frac{1}{2}$ diameters from end of snout, and 2 apart. Head strongly depressed, its upper surface being of a triangular shape, the base being a line drawn from one preopercular spine to its fellow, width of head at this place 3/4 of its length. Lower jaw slightly the longer: the maxilla reaches to below the middle

of the orbit. Interorbital space flat or slightly concave, two ridges extending backwards from the orbit, the internal dividing over the occiput, whilst the external or temporal terminates at the shoulder in two blade-like spines. One spine exists at the anterior-superior angle of the orbit, none at nostrils, which are patent but not tubular. Preorbital with three raised grooves starting in a stellated form from a common centre. Preopercle with most of its surface forming a portion of the flattened upper plane of the head, and having two very strong spines at its angle, the inferior of which is the longest and sometimes equals the diameter of the eye. Opercle with two spines. *Fins*—first dorsal spines weak, the first slightly the longest, interspinous membrane very slightly emarginate. A small, stout, single spine before the first dorsal, and sometimes another fine one between it and second dorsal, the rays of which anteriorly are as high as the spines of the first dorsal. Caudal obtuse or even rounded. *Colours*—brownish above, becoming dirty white beneath: fins spotted. Caudal yellow, with a deep black band, having a white border obliquely crossing its upper lobe, a second along its lower lobe.

The specimen of *P. tasmanius* "(?) Half-grown, Madras, Presented by T. C. Jerdon, Esq., M.D." in the B. M. catalogue, is a young *P. insidiator* nearly 6 inches long.

Habitat.—Red Sea, East coast of Africa, seas of India to the Malay Archipelago and beyond; attaining at least a foot and a half in length.

5. Platycephalus punctatus, Plate LX, fig. 3.

Cuv. and Val. iv, p. 243; Bleeker, Sclerop. p. 25; Quoy and Gaim. Voy. Astrol. Poissons, p. 682, pl. x, f. 2; Günther, Catal. ii, p. 180.

Platycephalus Malabaricus, Cuv. and Val. iv, p. 245 (Günther, Catal. ii, p. 181, not synon.); Day, Fish. Malabar, p. 45; Kner, Novara Fische, p. 121.

B. vii, D. 1 | 8 | 12, P. 21, V. 1/5, A. 11-12, C. 13, L. l. $\frac{110}{100}$, L. tr. 8/25.

Length of head $3\frac{1}{2}$ to $3\frac{2}{3}$, of caudal 8 to 9, height of body $6\frac{1}{2}$ in the total length. *Eyes*—diameter from 5 to $5\frac{1}{2}$ in the length of head, $1\frac{2}{3}$ to 2 diameters from end of snout, and 1/2 to 2/3 of a diameter apart. Interorbital space slightly concave. Width of head between the preopercular spines equals half its length. The maxilla extends to below first third of eye. Supraorbital margin with four or five teeth, the ridge from it towards occiput with two more small ones: ridge from eye to shoulder spine with three to four teeth: ridge from preorbital to preopercular spine with two or three teeth. A small spine internal to either front nostril. Spine at angle of preopercle strong, its length equalling about 1/7 of that of the head, superiorly it has a small one at its base, and inferiorly a large one directed slightly downwards as well as backwards. Posterior nostril rather tubular, anterior also tubular and with a valve which sometimes terminates in a short filament. A small spine above the axilla. *Teeth*—villiform in jaws, in two parallel bands on vomer, and in a long narrow patch along palatines. *Fins*—second spine of first dorsal not so high as the third to the sixth which are subequal in length, and 1/2 the length of the head: second dorsal anteriorly 3/4 the height of the spinous. Pectoral 1/2 and ventral 3/4 of length of head. Anal commences before second or third ray of dorsal. Caudal cut square. *Scales*—about 10 rows between the lateral-line and base of the spinous dorsal: those on the head and cheeks have no trace of any spine. *Lateral-line*—smooth in its entire extent, tubes with one or two simple branches. *Colours*—brown, becoming lighter beneath: four or five wide and dark bands pass from the back to the middle of the sides, and numerous black spots over head and body. First dorsal stained nearly black, second dorsal and anal yellowish, the first with brown points. Pectoral covered with dark markings so as to appear almost black. Ventral dark in its last two-thirds. Caudal dark.

The distinction between *P. punctatus* and *P. Malabaricus* is said to be that the latter has one more spine on the ridge of the infraorbital bone. The type specimen of the latter at Paris has L. l. $\frac{110}{100}$. The specimen figured has only two spines along each infraorbital bone.

Habitat.—Seas of India to the Malay Archipelago; the specimen figured ($9\frac{1}{2}$ inches long) is from Malabar, it attains at least 15 inches in length.

6. Platycephalus serratus.

Cuv. and Val. iv, p. 259; Günther, Catal. ii, p. 183.

B. vii, 1 | 8 | 11-12, P. 19, V. 1/5, A. 11, C. 13.

Length of head 1/4 of the total length. Interorbital space 1/4 of the transverse diameter of the eye. The crests on the various bones of the head and suborbital ring are serrated but destitute of spines. The supraorbital ridge is elevated: that across the opercle is smooth. The ridge from the eye to the angle of the preopercle is elevated and finely denticulated, above it is another less pronounced and smooth. Upper spine at the angle of the preopercle the largest, it is succeeded by a shorter one, and on the border of the interopercle are two more small ones, it does not appear to have any spine directed anteriorly, or if it has it is but a little one. *Teeth*—fine. *Scales*—with rough borders. *Lateral-line*—smooth. *Colours*—reddish-brown, with six or eight irregular brown bands descending from the back to the white abdomen. Fins gray, with black points. On the top of the dorsal a black blotch. Ventrals bluish above and whitish below.

Habitat.—Trincomalee, to 7 inches in length.

7. Platycephalus carbunculus.

Cuv. and Val. ix, p. 461 ; Cantor, Catal. p. 39.
Platycephalus Malabaricus, Günther, Catal. ii, p. 181, pt. (not synon.)

B. vii, D. 1 | 8 | 11-12, P. 20, V. 1/5, A. 11-12, C. 13, L. l. $\frac{75-80}{65-70}$, L. tr. 6/25.

Length of head 3 to $3\frac{1}{2}$, of caudal 5 to 6, height of body $6\frac{3}{4}$ in the total length. *Eyes*—diameter 1/4 of length of head, 1 diameter from end of snout, and 1/4 of a diameter apart. Supraorbital edge with one or two spines anteriorly, and a strongly serrated edge, posteriorly from the orbit the line to the occiput has six, and the one to the shoulder spine five more spines. From the preorbital exists a raised line armed with 10 or 12 spines going to the two preopercular spines, the upper (which has a small one at its base) is longer than the lower. A pair, or even three, of turbinal spines, no nasal tentacle. Two well marked opercular spines, and another in the axilla. *Fins*—ventral reaches the origin of the anal: caudal cut square. *Scales*—ctenoid, present on the head, but destitute of spines or raised points. *Lateral-line*—smooth. *Colours*—brownish, with numerous brown spots: three vertical bands on the body, one broad one through the anterior half of the first dorsal to the abdomen, the second through the middle of the second dorsal, and the third over the free portion of the tail: opercle dark: posterior half of first dorsal black: second dorsal spotted: pectoral with several lines of spots and a dark mark near its base: caudal dark, with one or two ill-defined vertical bands.

Habitat.—Western coast of India to the Malay Archipelago. Cantor observes that it occurs, although not numerously, at all seasons at Pinang, and it is eaten by the natives: his specimens were up to $6\frac{1}{2}$ inches in length.

FAMILY, XXVI—CATAPHRACTI, *Cuv.*

Branchiostegals one to six: pseudobranchiæ present or absent. Infraorbital bones articulate with the preopercle. Head and body more or less angular, cuirassed with plates, or keeled scales entirely cover the body. The opercular pieces may or may not be anchylosed to one another. Teeth present or absent in the jaws, in one species present on the vomer. One or two dorsal fins: pectorals may be simple, with or without free rays, or they may be divided by a notch into two portions, and elongated or not so: ventrals thoracic, with five or less rays. Lateral-line present, or absent. Air-vessel present or absent. Pyloric appendages, when present, in small, moderate numbers, or numerous.

SYNOPSIS OF GENERA.

1. *Dactylopterus.* A long spine at angle of preopercle. Dorsal fin with detached rays anteriorly: pectorals very elongate, with the anterior portion detached and shorter than the rest of the fin.

2. *Pegasus.* No spine at angle of preopercle. Pectorals rather elongate and with unbranched rays.

Genus, 1—DACTYLOPTERUS* (*Lacép.*).

Branchiostegals six. Head with its surfaces more or less flattened, and laterally and superiorly bony. The angle of the preopercle and the shoulder bone each produced into the form of a long spine. Granular teeth in the jaws only. Two dorsal fins of nearly equal length: pectorals much elongated, with the anterior portion detached from and shorter than the upper. Scales on body keeled and of a moderate size. Lateral-line absent. Air-vessel in two lateral portions, each furnished with a large muscle. Pyloric appendages in moderate numbers or numerous.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Dactylopterus Orientalis*, D. 1 | 1 | 5 | 8, A. 6. Pectoral fin very long: dorsal, caudal, and pectoral rays spotted. Seas of India to the Malay Archipelago and beyond.

Dactylopterus Orientalis, Plate LX, fig. 6.

Cuv. and Val. iv, p. 134, pl. 76; Richardson, Ich. China, p. 218; Bleeker, Amb. and Ceram. p. 264; Temm. and Schleg. Fauna Japon. Poissons, p. 37, pl. 15, A.; Jerdon, M. J. L. and Sc. 1851, p. 141; Günther, Catal. ii, p. 222, and Proc. Z. S. 1871, p. 663.

Dactylopterus Japonicus, Bleeker, Japan, p. 396.

Dactylopterus chirophthalmus, Bleeker, Nat. Tyds. Ned. Ind. 1854, iv, p. 494; Günther, Catal. ii, p. 223.

B. vi, D. 1 | 1 | 5-6 | 8, P. 30, V. 6, A. 6, C. 9, Vert. 9/13, Cæc. pyl. 18-19.

Length of head (including preopercular spine) 3 to $3\frac{1}{2}$, of caudal $5\frac{1}{2}$, height of body $5\frac{1}{2}$ to 6 in the total length. *Eyes*—nearly 1 diameter from end of snout, and also apart. Interorbital space concave traversely. A strong spine at the angle of the preopercle more than half the length of the rest of the head. Bony covering of the head produced backwards a little below the back to as far as below second or third dorsal spine. A shoulder spine. *Fins*—an elongated filament arises over occiput and is 1/2 longer than the head: a second midway between it and the first dorsal spine than which it is half shorter, it is detached from the fin. Fin rays unbranched except the last few of the dorsal, and sometimes of the anal, also those of the caudal which are bifid. Pectoral reaching to the end of the caudal, its first few rays are short, and rather detached from the remainder of the fin, its middle ones are the longest. *Scales*—with a ridge along each, and a large one forms an oblique keel along either side of the base of the caudal fin. *Colours*—pinkish, having a tinge of blue along the abdomen: dorsal and caudal rays spotted: pectoral gray along its centre, and the whole of the fin spotted, in the young it appears to have a large round black spot edged with white.

Jerdon observes of this fish "*Ana toumbi*, Tam. rare at Madras." I did not procure it whilst there, but have received the remains of a dried Madras specimen from Sir W. Elliot.

Habitat.—Seas of India to the Malay Archipelago and beyond. The figure is taken from a specimen in the British Museum.

Genus, 2—PEGASUS, *Linn.*

Fam. *Pegisidæ*, Richards.

Branchiostegals one: pseudobranchiæ absent. Gills four: gill-opening narrow, in front of the pectoral fin. Body broad and depressed, covered with bony plates, which are anchylosed on the trunk and moveable on the tail. Gill-cover formed of one bony plate, and a small interopercle concealed by it. No teeth. One short dorsal and anal fin opposite to one another: pectorals horizontal and long, composed of simple rays, some of which may be spinous: ventral with one or two rays, the outer being elongated. Air-vessel absent.

* Part of Family TRIGLOIDEI, Bleeker.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Pegasus draconis*, D. 5, A. 5. Lateral edges of snout serrated. Body with brown markings; snout and last caudal rings black: pectoral with a white band and white edge.

1. Pegasus draconis, Plate LXI, fig. 1.

Pisciculus Amboinensis, Gronov. Mus. Ich. i, p. 65, No. 146.

Pegasus draconis, Linn. Syst. Nat. i, p. 418; Bloch, t. 109, figs. 1 and 2; Lacép. ii, pp. 77, 78, pl. 2, f. 3; Günther, Catal. viii, p. 147.

Pegasus volans, Lacép. ii, p. 83; Bleeker, Nat. Tyds. Ned. Ind. iii, p. 307.

? *Pegasus latirostris*, Richards. Ich. China, p. 203.

Cataphractus draco, Gronov. ed. Gray, p. 144.

Pegasus draco, Swainson, Fishes, ii, p. 332; Kanp. Lopho. p. 5, and *P. natans*, pl. i, f. 3; Jerdon, M. J. L. and Sc. 1851, p. 150; Günther, Fish. Zanz. p 138.

B. i, D. 5, P. 11, V. 2, A. 5, C. 8.

Body broad and depressed. *Eyes*—$2\frac{1}{2}$ diameters from end of snout, and 2 apart. Interorbital space transversely concave, two deep grooves on the neck. Under surface of body nearly flat, the expanded body portion with two median and two lateral ridges, whilst there are three cross ridges: at the meeting points of the various ridges are obtuse points. Caudal portion composed of eight rings, most of the anterior five of which have a lateral spinate elevation. Lateral edges of snout denticulated: a serrated ridge runs along the upper edge of orbit, and is continued along the snout to its end. *Fins*—pectorals horizontal, the anterior rays the shortest, all the fin rays simple. Vent situated midway behind the posterior edge of the orbit and the root of the caudal fin. *Colours*—body with brown reticulations, snout and last caudal ring black. Pectoral gray, with its rays spotted, having a white outer edge and sometimes a white band.

Richardson observes that *P. latirostris*, has the form of *draco*, but the back is nearly as broad as it is long.

My single specimen was taken at Port Blair by Dr. Rean. I never captured one alive, although several times at the Andamans I observed them skimming a short distance above the surface of the water.

Habitat.—Seas of India to the Malay Archipelago and beyond. Specimen figured life-size.

FAMILY, XXVII—GOBIIDÆ.

Pseudobranchiæ present, sometimes rudimentary. Gill-openings varying from extremely narrow to wide: the gill membranes attached to the isthmus: four gills. Body generally elongated. Eyes lateral, occasionally prominent, and mostly without free orbital margins, the skin being continued directly over their surface. The infraorbital ring of bones does not articulate with the preopercle. Teeth of varying characters, canines present or absent: inferior pharyngeal bones may be separated, or coalesced with a median suture. A single rayed dorsal fin, sometimes divided into two portions, the spines are flexible, and this part of the fin has less rays than the remainder: anal similar to the soft dorsal: ventrals sometimes united so as to form a disk, or arising close together. Scales and lateral-line present or absent. Air-vessel generally absent. Pyloric appendages, if present, few.

This Family has been subject to numerous subdivisions, due to the great variations observable amongst those species of which it is composed. Bleeker in his elaborate paper divides them as follows :—

I. *Eleotriformes*, with the ventrals free and completely separated.
II. *Gobiiformes*, with the ventrals entirely united together, or only in their basal halves: two dorsals separated or only united at their bases.
III. *Amblyopodiformes*, with the vertical fins united, a single dorsal which occupies the entire length of the back.
IV. *Luciogobiiformes*, with a single short dorsal situated in the last half of the body.

SYNOPSIS OF GENERA.

A. Gobiina.* Ventrals forming a disk, being united along their whole extent, or only in their basal halves: two separate dorsal fins.

1. *Gobius.* Ventrals only adherent to the abdomen at their bases. Scales more or less present. Simple teeth in the jaws in one or more rows: canines present or absent.
2. *Gobiodon.* Body oblong, compressed. Scales absent. Teeth in jaws in several rows; usually two canines near symphysis of lower jaw.
3. *Sicydium.* Ventrals short, adherent to the abdomen. Scales present. Teeth in the jaws moveable, being situated in the gums or lips.
4. *Apocryptes.* Ventrals only adherent to the abdomen at their bases. Scales present. Teeth in the jaws in a single row, those in the lower jaw subhorizontal: a pair of posterior canines above the mandibular symphysis.
5. *Apocryptichthys.* No posterior canines above the mandibular symphysis.
6. *Periophthalmus.* Eyes very prominent. Base of pectorals very muscular. Scales present. Teeth erect in both jaws in one or two rows, some of which are canine-like.
7. *Boleophthalmus.* Eyes very prominent. Base of pectorals very muscular. Scales present. Teeth in jaws in a single row, those in the lower jaw horizontal, having a pair of posterior canines.

B. Eleotrina.† Ventrals not united together.

8. *Bostrichthys.* Eyes not prominent. Vomerine teeth. Scales present.
9. *Eleotris.* Eyes not prominent. Teeth small and usually without canines: none on palate. Scales present. Anal papilla distinct.

* GOBIIFORMES, Bleeker, is thus primarily divided—
1. *Gobiodontini.* Teeth in the jaws in several rows, fixed: the outer row in the premaxillaries the longer.
2. *Gymnogobiini.* Teeth in the jaws fixed.
3. *Latrunculini.* Teeth in lower jaw in a single row.
4. *Triænophorichthyini.* Part of the teeth in the jaws tricuspidate.
5. *Sicydiini.* Moveable teeth in the gums or lips.
6. *Gobiini.* Simple teeth in the jaws, neither clubbed nor incised at their extremities: from one to many rows in the premaxillaries: from two to many rows in the lower jaw.
7. *Periophthalmini.* Teeth in the jaws conical, fixed and in one or two rows: conical and sharp in the pharyngeals.
8. *Apocrypteini.* Teeth in a single row in either jaw, those in the lower jaw sub-horizontal, whilst there are also two erect canines above the symphysis of the lower jaw and behind the outer row.

† ELEOTRIFORMES, Bleeker, is thus primarily divided :—
1. *Eleotrini* :—
   a. *Philypni.* Several rows of teeth in jaws: vomerine teeth.
   b. *Eleotrii.* Palate and tongue edentulous.
   c. *Butii.* Several rows of teeth in jaws without canines. Palate and tongue edentulous.
2. *Hypseleotrini.* Teeth in the jaws in several rows, the external slender and moveable.
3. *Pareleotrini.* Teeth in the jaws fixed: none on the palate or tongue.

C. Amblyopina.* **Vertical fins united, a single dorsal occupying the whole length of the back.**

10. *Gobioides.* Anterior teeth very strong: no cavity above the opercle. Scales, when present, rudimentary.

11. *Trypauchen.* Several rows of teeth in each jaw, the outer the longer. No canines. A cavity above the opercle.

A. Gobiina. Ventrals forming a disk, being united along their whole extent or in their basal halves. Two separate dorsal fins.

Genus, 1—Gobius,† *Artedi.*

Branchiostegals five: pseudobranchiæ. Gill-openings of moderate width. Body low and elongated. Opercles

* Amblyopodiformes, Bleeker, is thus primarily divided—
1. *Amblyopodini*, B. v, body very elongate, no post-temporal fossa.
2. *Trypauchini*, B. iv, several rows of teeth in either jaw, the outer row the longer and very sharp, internal row of a conical grain shape. A post-temporal fossa.

† Although in my opinion minutely sub-dividing this large Genus will not conduce to aiding the enquirer in determining the species of a specimen, still I consider it necessary to give a synopsis of Bleeker's elaborate paper on the dentition of the Gobiini, many of which fishes are included in Genus *Gobius*, Artedi.

Gobiini:—Teeth in jaws simple, their apices being neither clubbed nor incised: in one or two rows in upper, in two or more in lower, jaw.

I. *Brachygobii.* No canines.
1. *Lophogobius*, Gill. Body compressed. Teeth in both jaws in many villiform rows, the outer the longer. Scales ctenoid.

II. *Platygobii.* Teeth in many rows in both jaws. No true canines.
2. *Gillichthys*, Coop.=*Gillia*, Günther. Teeth villiform in both jaws. Scales small, cycloid.
3. *Gobiopsis*, Steind. Teeth, the outer row the larger. Scales large, ctenoid.
4. *Glossogobius*, Gill=*Cephalogobius*, Bleeker. Outer row of teeth the longer, curved, not crowded together, unequal. Upper jaw not produced posteriorly.
5. *Platygobius*, Bleeker. Teeth, outer row in premaxillaries scarcely enlarged, in the lower jaw not enlarged.

III. *Eugobii.* Teeth in jaws fixed.

a. Teeth in both jaws sharp, in many rows, with the outer one enlarged: no canines.

6. *Gobius*, Artedi=*Pomatoschistus*, Gill. Teeth in the outer row conical and subequal: caudal obtuse. Scales ctenoid. Abdomen scaled. Snout short.
7. *Acanthogobius*, Gill. Teeth in the outer row subequal: caudal obtuse. Scales ctenoid. Snout conical.
8. *Brachygobius*, Bleeker=*Hypogymnogobius*, Bleeker. Teeth in the outer row subequal. Abdomen scaleless.
9. *Eucyclogobius*, Gill. Teeth in the outer row subequal. Scales cycloid, none on the head.
10. *Lepidogobius*, Gill=*Cyclogobius*, Steind. Teeth in the outer row subequal. Scales cycloid. Head scaled.
11. *Callogobius*, Bleeker. Teeth in the outer row, slender, subequal. Caudal lanceolate. Head depressed, convex.
12. *Stenogobius*, Bleeker. Teeth in the outer row, conical, subequal. Caudal obtusely lanceolate, longer than the head.
13. *Actinogobius*, Bleeker. Teeth in the outer row unequal. Caudal acute, shorter than the head.

b. Teeth in each jaw in many rows, the outer the longer: some truncated.

14. *Hemigobius*, Bleeker. Some of the middle teeth of the outer row in the premaxillaries truncated.

c. Teeth in each jaw in many rows, pointed, subequal, the outer row erect and not elongated. No canines.

15. *Awaous*, Val. Scales 50 to 60.
16. *Rhinogobius*, Gill=*Chonephorus*, Poey. Scales 28.

d. Teeth in either jaw in many pointed rows, the outer the longer: in the lower jaw laterally a posterior curved canine.

17. *Ctenogobius*, Bleeker. Head scaleless. Scales 14 to 30.
18. *Centrogobius*, Bleeker=*Oplopomus*, Steind. First dorsal spine pungent.
19. *Acentrogobius*, Bleeker=*Porogobius*, Bleeker. Head scaled. No pungent dorsal spine. Caudal lanceolate.
20. *Amblygobius*, Bleeker=*Odontogobius*, Bleeker. Scales 52 to 56.
21. *Cryptocentrus*, Ehr.=*Pargobius*, Bleeker. Scales 85 to more than 100.

e. Teeth in both jaws pointed, and in two rows.

22. *Zonogobius*, Bleeker. Outer row of teeth in upper and inner in lower jaw the longer.
23. *Lophiogobius*, Günther. Teeth in two rows in each jaw, the outer row the longer, placed wide apart and sub-horizontal. No canines.

f. Teeth pointed, in one or less than two rows in the upper and many in the lower jaw. Canines present or absent.

24. *Stigmatogobius*, Bleeker. Teeth in one row in the upper jaw: outer row in the lower jaw the longer, and posteriorly above the symphysis two canines.
25. *Euctenogobius*, Gill. A single row of teeth in the premaxillaries, few rows in lower jaw: no canines.
26. *Oxyurichthys*, Bleeker.=*Gobiichthys*, Klunz. Teeth in premaxillaries in one or less than two rows, the inner of which is rudimentary: many rows in the lower jaw, the outer being the longer: no canines. Caudal lanceolate.

IV. *Chæturichthyi.* No canines: barbels on lower jaw.
27. *Chæturichthys*, Rich. Teeth in two rows in either jaw, the outer row close together, the longest, and consisting of fixed, curved, subulate teeth directed obliquely inwards.
28. *Amblychæturichthys*, Bleeker. Teeth in the premaxillaries in few rows, the outer the longer, fixed, straight, subulate: three or laterally two rows in the lower jaw, the outer the longer, moveable, straight, and directed obliquely inwards.
29. *Parachæturichthys*, Bleeker. Many rows of teeth in both jaws, the outer row close together, consisting of elongated, straight, and fixed ones.

V. *Gobionelli.* Teeth in both jaws in many rows.
30. *Synechogobius*, Gill. Pointed fixed teeth in both jaws, the outer the longer.
31. *Gobionellus*, Gir.=*Samaragdus*, Poey. Teeth small, the outer row setaceous and moveable.

unarmed. Simple teeth in one or more rows in the upper, and two or more in the lower jaw: canines sometimes present. Anterior portion of the dorsal fin, with from five to six flexible spines: the posterior more developed and of the same character as the anal: ventrals united, forming a disk, which is only attached by its base, each has one spine and four or five rays. Caudal rounded or pointed. Scales present or absent, and either cycloid or ctenoid. Lateral-line absent. Air-vessel, when present, generally small. Pyloric appendages usually absent.

The fishes comprised in this Genus have the form of the body variously modified, some being much deeper than others. They are either wholly scaled, the head may be scaleless, and even the body partially or entirely devoid of scales. Barbels or warts on the head or a crest on the occiput may be present or absent.

The dentition also is subject to considerable modification, canines being present or absent, most distinctly in the form of a recurved one on the outer side of the enlarged lateral row in the lower jaw, and more commonly found in the marine than in the fresh-water species. Variations may also occur in specimens of the same species. Amongst a series of *G. striatus* exists one in which the outer row of teeth in both jaws is abnormally enlarged, thus occasioning canines where they are not normally to be found.

In some the two dorsal fins are almost united at their bases, in others there is a longer or shorter interspace between them, whilst the form of the fins and the character of the spines are subject to great variations.

These fishes are found in numbers along the shores and estuaries of India, but due to their rapidly decomposing after death full collections have yet to be made. Amongst Sir Walter Elliot's figures of the Gobies captured at Waltair, are two or three which I am unable to recognise, but it would be manifestly unsafe to found new species upon drawings alone.

Amongst the fresh-water Gobies, the *G. giuris*, H. B. is largely bred in tanks and shows considerable diversity not only in its proportions, but also in its colours, this has occasioned its having been subdivided into several species.

SYNOPSIS OF SPECIES.

A. *Lateral, recurved canines, present in the lower jaw: dorsal spines flexible.*

1. *Gobius Bynoensis*, D. 6 | $\frac{1}{16}$, A. $\frac{1}{15\text{-}16}$, L. l. 65, L. tr.* 16. Two longitudinal bands, and some cross bars from the back. Andamans to Malay Archipelago and beyond.
2. *Gobius sexfasciatus*, D. 6 | 11, A. 10. Scales minute. Six vertical bands. Madras.
3. *Gobius brevirostris*, D. 6 | $\frac{1}{10}$, A. 10, L. l. 44, L. tr. 14. Scales very small to below the commencement of second dorsal fin. Olive, with a dark median band. Sind and China.
4. *Gobius griseus*, D. 6 | $\frac{1}{10}$, A. 10, L. l. 42, L. tr. 14. Olivaceous, with black spots. Madras.
5. *Gobius polynema*, D. 6 | 11, A. 10, L. l. 28-30, L. tr. 8. Purplish-black: a yellow-edged ocellus at upper portion of base of caudal fin. Seas of India to China and beyond.
6. *Gobius macrostoma*, D. 6 | 11, A. 10, L. l. 33. Vertical fins with dark streaks. Bombay.
7. *Gobius viridipunctatus*, D. 6 | $\frac{1}{10}$, A. $\frac{1}{9}$, L. l. 34-38, L. tr. 9. Olive, with some blotches along the sides, and some of the scales with brilliant green centres. Seas of India.
8. *Gobius ocellatus*, D. 6 | $\frac{1}{10}$, A. $\frac{1}{10}$, L. l. 33, L. tr. 8. Olive, with small green spots, blotches along the sides: vertical fins spotted: a yellow ocellus at top of last half of caudal fin. Bombay.
9. *Gobius Masoni*, D. 6 | $\frac{1}{10\text{-}11}$, A. $\frac{1}{9}$, L. l. 28, L. tr. 10. Gray with black fins, and blue spots on the body. Bombay.
10. *Gobius cyanosmos*, D. 6 | $\frac{1}{10}$, A. 10, L. l. 28-30, L. tr. 8. Olive, many scales with blue spots, a blue mark on shoulder. Seas of India to the Malay Archipelago.
11. *Gobius criniger*, D. 6 | 10, L. l. 26-32, L. tr. 12-13. No scales before the first dorsal fin. Olivaceous with black blotches and spots. East coast of Africa, seas of India to the Malay Archipelago and beyond.
12. *Gobius puntang*, D. 6 | $\frac{1}{10}$, A. 10, L. l. 28-29, L. tr. 8-9. Olive with rusty spots, fin rays yellow, spotted and barred with purplish-red. Andamans to the Malay Archipelago.
13. *Gobius Bleekeri*, D. 6 | $\frac{1}{9}$, A. $\frac{1}{8}$, L. l. 32, L. tr. 11. With cloudy dark markings, upper half of first dorsal dusky, a large bluish spot from first to fourth spine. Madras.
14. *Gobius zonalternans*, D. 6 | $\frac{1}{9}$, A. $\frac{1}{9}$, L. l. 27, L. tr. 6. A blue spot on opercle, body with angular bands. Madras.
15. *Gobius biocellatus*, D. 6 | $\frac{1}{9}$, A. $\frac{1}{8}$, L. l. 28-30, L. tr. 7-8. Some large blotches along the sides, a black ocellus with a white edging in hind portion of first dorsal fin, dorsal fins white spotted. Seas of India to the Malay Archipelago.
16. *Gobius Madraspatensis*, D. 6 | $\frac{1}{9}$, A. $\frac{1}{9}$, L. l. 28-29, L. tr. 7. Irregular vertical brown bands: vertical fins spotted. Madras.
17. *Gobius Neilli*, D. 6 | $\frac{1}{8}$, A. 9, L. l. 28, L. tr. 7. Ochreous, upper two-thirds of body blotched and with dark marks: upper portion of first dorsal white, some of the fins barred. Madras.
18. *Gobius melanosticta*, D. 6 | $\frac{1}{8\text{-}9}$, A. 9, L. l. 24, L. tr. 7. Light brown, scales of body with dark marks: vertical fins spotted. Madras.

* By L. tr. is signified the number of horizontal rows of scales existing between the commencement of the base of the second dorsal and that of the anal fins.

B. No lateral recurved canines in the lower jaw: dorsal spines flexible.

19. *Gobius cristatus*, D. 6 | 14, A. 14, L. l. 50-60, L. tr. 11-12. Scales cycloid. A light ocellus at base of pectoral fin: body spotted and blotched: caudal spotted in its upper half. Bombay.

20. *Gobius tentacularis*, D. 6 | $\frac{1}{12}$, A. $\frac{1}{13}$, L. l. 60, L. tr. 10. An orbital tentacle. Scales ctenoid. Dull green with reddish spots: vertical fins spotted. Seas of India to the Malay Archipelago.

21. *Gobius acutipinnis*, D. 6 | $\frac{1}{10\text{-}11}$, A. $\frac{1}{11}$, L. l. 25-28, L. tr. 6-7. Some blotches along the body, a brown band from the eye over the cheeks: dorsal fins longitudinally barred. Seas of India to the Andamans.

22. *Gobius striatus*, D. 6 | $\frac{1}{10}$, A. 10, L. l. 55-60, L. tr. 14. Yellowish, with some blotches along the sides: fins barred in spots. Fresh waters of India.

23. *Gobius personatus*, D. 6 | $\frac{1}{10}$, A. $\frac{1}{10}$, L. l. 55, L. tr. 14. Light brown, with vermiculated markings. Seas of India to the Malay Archipelago.

24. *Gobius Malabaricus*, D. 6 | $\frac{1}{10}$, A. $\frac{1}{10}$, L. l. 50, L. tr. 9. First dorsal with a black crescentic mark. Malabar.

25. *Gobius planifrons*, D. 6 | $\frac{1}{10}$, A. 10, L. l. 46, L. tr. 15. Head wide. Olive, fins dark gray, a black mark at base of pectoral. Bombay.

26. *Gobius elegans*, D. 6 | $\frac{1}{10}$, A. 10, L. l. 36, L. tr. 9. Blotched and banded. Seas of India to the Malay Archipelago.

27. *Gobius ornatus*, D. 6 | $\frac{1}{10}$, A. $\frac{1}{8\text{-}9}$, L. l. 26-28, L. tr. 7. Many oblong brown spots and yellow dots: fins dotted with black. Red Sea to the Malay Archipelago.

28. *Gobius gutum*, D. 6 | $\frac{1}{10}$, A. 11. Dark spots clustered into cloud-like blotches: vertical fins spotted. Lower portions of Hooghly.

29. *Gobius albopunctatus*, D. 6 | $\frac{1}{9}$, A. $\frac{1}{8}$, L. l. 35-40, L. tr. 11-12. Brownish, irregularly marbled, head and body spotted, some of the spots white. Red Sea, seas of India to Australia.

30. *Gobius giuris*, D. 6 | $\frac{1}{8\text{-}9}$, A. $\frac{1}{8\text{-}9}$, L. l. 30-34, L. tr. 9. Brown, with blotches along the sides: dorsal and caudal barred in spots. Fresh waters of India to the Malay Archipelago, China, and beyond.

31. *Gobius semidoliatus*, D. 6 | $\frac{1}{9}$, A. 8, L. l. 28, L. tr. 9. Chestnut, with red bands on the head and below the first dorsal fin. Red Sea, Andamans.

32. *Gobius magniloquus*, D. 6 | $\frac{1}{8}$, A. 9, L. l. 38, L. tr. 10. Maxilla reaches to below hind edge of eye. Brown spotted. Madras.

33. *Gobius planiceps*, D. 6 | $\frac{1}{8}$, A. 9, L. l. 38, L. tr. 10. Maxilla reaches to below first third of eye. Dark brown angular bands on the body. Madras.

34. *Gobius sadanundio*, D. 6 | $\frac{1}{8}$, A. $\frac{1}{8}$, L. l. 28-30, L. tr. 8. Greenish, with large black spots. Estuaries of the Ganges to Burma.

35. *Gobius melanosoma*, D. 6 | $\frac{1}{8}$, A. 10, L. l. 22, L. tr. 9. Black. Andamans to the Malay Archipelago.

36. *Gobius nunus*, D. 5 | $\frac{1}{9}$, A. 9, L. l. 30, L. tr. 10. Six black belts round the head and body. Hooghly and Burma.

A. Lateral recurved canines present in the lower jaw: dorsal spines flexible.

1. Gobius Bynoensis, Plate LXI, fig. 3.

Richardson, Ich. Erebus and Terror, p. 4, pl. 1, f. 1, 2; Günther, Catal. iii, p. 70; Peters, Monats. Akad. Berlin, 1868, p. 266.

Gobius stethophthalmus, Bleeker, Nat. Tyd. Ned. Ind. i, p. 249, f. 17, and xv, p. 236.

Odontogobius Bynoensis, Bleeker, Gobioides (1874), p. 35=*Amblyogobius Bynoensis*, Bleeker, *MSS.*

B. v, D. 6 | $\frac{1}{10}$, P. 19, V. 1/5, A. $\frac{1}{15\text{-}16}$, L. l. 65, L. tr.* 16.

Length of head $4\frac{1}{2}$ to 5, height of body 5 to $5\frac{1}{2}$ in the total length. *Eyes*—diameter 1/4 to 1/5 of length of head, 1 diameter from end of snout, and 1/2 a diameter apart. Head rather higher than broad: snout obtuse: cleft of mouth a little oblique, commencing opposite the centre of the eyes, the maxilla reaches to below anterior edge or first-third of the orbit. *Teeth*—two or three rows in either jaw, with an outer row of about 10 large ones in the premaxillaries: outer row in the lower jaw enlarged, elongated, and sub-horizontal, the outer one or two of which on either side are large, obliquely placed, canines. *Fins*—dorsal spines weak, having filiform terminations, the two dorsals of about equal height, and the bases of the two separated by a very short interspace. Pectoral nearly as long as the head. Caudal rounded, its central rays the longest. *Scales*—ctenoid, 16 rows between the bases of the second dorsal and anal: anterior to the dorsal fin they are very small, and are continued forwards to opposite the middle of the eyes, whilst there are a few on the upper portion of the opercle: those on the free portion of the tail are the largest. *Colours*—greenish, back with from eight to ten darkish cross bars. Two longitudinal bands, the superior from the snout through the eye, at first black, becoming yellow on the body and ending at the extremity of the soft dorsal: the second from the mouth to the pectoral, forming a dark band across the opercles, becoming a black spot at the base of the pectoral, and continued as a golden band to the centre of the base of the caudal, which last fin has a dark spot at the upper part of its base: anal with a dark margin.

* By L. tr. is signified in the Gobies the number of rows of scales between the origins of the second dorsal and anal fins.

Habitat.—Andamans, Malay Archipelago to Australia: the specimen figured (life-size) is from the Andamans.

2. **Gobius sexfasciatus**, Plate LIX, fig. 4.

B. v, D. 6 | 11, P. 19, V. 1/5, A. 10, C. 15, Sc. minute.

Length of head $4\frac{1}{2}$, of caudal $4\frac{1}{2}$, height of body 6 in the total length. *Eyes*—diameter $3\frac{1}{2}$ in length of head, not 1/2 a diameter from end of snout, and 1/6 of a diameter apart. Greatest width of head equals 4/7 of its length, and its height equals its length excluding the snout. Anterior profile of head very obtuse. Lower jaw the longer: cleft of mouth oblique, the anterior extremity of the mouth commencing opposite the lower third of the eye: the maxilla reaches to below the hind edge of the eye. Preopercle without any spine. *Teeth*—in several villiform rows, and an outer enlarged one in either jaw, those in the mandibles being the smaller and confined to about 16 at its anterior extremity, the outer of which is recurved. *Fins*—dorsal spines weak and filiform, the third being about as long as the body is high. Anterior dorsal rays not half so long as the spines, its last rays the longest. Pectoral as long as the head excluding the snout. Ventral not adherent to the abdomen, it does not reach the vent. Anal commencing below the second dorsal ray, and is similar to that fin. Caudal wedge-shaped. *Scales*—minute over body, becoming somewhat larger towards the tail. *Colours*—grayish-brown, with six bands descending from the back towards the middle of the sides: opercle covered with a large dull blotch. Fins grayish, stained darker at their edges. Upper half of caudal yellow, and barred with light brown spots. A black mark between the two first dorsal spines, about the centre of their height.

Habitat.—The specimen figured (life-size) was captured at Madras in June, 1867.

3. **Gobius brevirostris**, Plate LXIII, fig. 5.

Günther, Catal. iii, p. 41.

B. v, D. 6 | $\frac{1}{10-11}$, P. 17, V. 1/5, A. 10, C. 13, L. l. 44, L. tr. 14.

Length of head $4\frac{1}{4}$, of caudal $5\frac{1}{2}$, height of body 6 in the total length. *Eyes*—1/5 of length of head, 1 diameter from end of snout and apart. Upper profile of head parabolic. Width of head equals its height, and its length behind the middle of the orbit. Lower jaw slightly the longer. Mouth oblique, its cleft commencing opposite the lower edge of the eye, the maxilla extends to below the anterior third of the orbit. No tentacles or barbels on the scaleless head. *Teeth*—in several villiform bands with an outer enlarged row: a recurved canine at either extremity of the enlarged row in the lower jaw. *Fins*—dorsal spines flexible, the second or longest equals the length of the postorbital portion of the head. Caudal wedge-shaped. Pectoral as long as the head without the snout. Ventral extends half way to anus: caudal rounded. *Scales*—ctenoid, increasing in size posteriorly: a few rows on the head in old specimens, none in small ones: about 25 rows before base of dorsal fins: 13 rows between the second dorsal and anal fins. *Colours*—olivaceous, with a blotched irregular band running from the mouth to the centre of the base of the caudal fin: a narrow brown band from the eye to above the opercle, terminating above the axilla in a large light blue ocellus. Two small bluish spots on the opercle at its upper margin, another at the upper edge of the base of the caudal. Dorsal fins with a violet coloured basal half. Anal white, having a violet band along its centre, lightish blue superiorly and white externally. Caudal with blackish margins.

Habitat.—Kurrachee, where the specimen figured (life-size) was obtained, to China.

4. **Gobius griseus**, Plate LXIII, fig. 3.

B. v, D. 6 | $\frac{1}{10}$, P. 17, V. 1/5, A. 10, C. 14, L. l. 42, L. tr. 14.

Length of head $4\frac{2}{3}$, of caudal $5\frac{1}{2}$, height of body $4\frac{1}{2}$ in the total length. *Eyes*—upper margin near the dorsal profile: diameter $4\frac{1}{2}$ in length of head, 1 diameter from end of snout, and 1/4 of a diameter apart. Head as wide as high or as its length without the snout. Lower jaw the longer, cleft of mouth rather oblique, the maxilla reaches to below the first-third of the eye. Numerous rows of warts on the cheeks and opercles, which are but little apparent in the young. No barbels. *Teeth*—in several very fine villiform rows in both jaws, the outer row in the premaxillaries much enlarged, especially near the symphysis: the outer eight or ten in the front of the lower jaw are still larger, and the external on either side is a large recurved canine. *Fins*—spines of first dorsal ending in filamentous prolongations, and being rather higher than the body, its base ends close to the commencement of the second dorsal, the last ray of which reaches the base of the caudal. Pectoral as long as the head: ventral reaches half way to the anal. Caudal wedge-shaped, the central rays being the longest. *Scales*—ctenoid and angular, largest in the posterior portion of the body, very small (20 or 30 rows) anterior to the dorsal fin, they extend as far as to the eyes: 14 rows between the bases of the second dorsal and anal fins. A few very fine ones on the upper part of the opercles: the scales do not show the sudden increase in size from under the commencement of the second dorsal fin as seen in *G. brevirostris*. *Colours*—olivaceous, with bands and many well marked deep brown or black spots. Pectoral fin and contiguous portions of the body finely dotted with small chestnut spots. Base of first dorsal yellowish with three or four horizontal brown bands and usually a dark mark near its posterior extremity: second dorsal yellowish with a dark outer edge. Ventral, anal, and caudal with dark outer edges.

Due to an error, one of the smaller specimens was given to the artist to figure, it does not show the dorsal spines so elongate, whilst the scales extend forward anteriorly to only midway between the base of the dorsal and posterior edge of the eye, and a series of specimens conclusively shows that the scaled space increases anteriorly with age.

Habitat.—Madras, in the backwaters, up to $3\frac{1}{2}$ inches in length. It dies when placed in fresh water.

5. Gobius polynema, Plate LXI, fig. 8.

Chæturichthys polynema, Bleeker, Japan, p. 44, f. 4.
Gobius polynema, Günther, Catal. iii, p. 46.
Parachæturichthys polynema, Bleeker, Gobioides, 1874, p. 37.

B. v, D. 6 | 11, P. 21, V. 1/5, A. 10, C. 13, L. l. 28-30, L. tr. 8.

Length of head 1/5, of caudal 1/4, height of body 1/6 to 1/8 of the total length. *Eyes*—diameter 4 to $4\frac{1}{2}$ in the length of head, about 1 diameter from end of snout, and 2/3 of a diameter apart. Head rather flat superiorly, as broad as high and equalling its length excluding the snout. Snout moderately rounded, cleft of mouth oblique, commencing opposite the lower edge of the eye, jaws of equal length anteriorly: the maxilla reaches to below the first third of the orbit. *Barbels*—several small ones below the lower jaw, and nearer its posterior than its anterior extremity. *Teeth*—villiform, the outer row the largest, a small recurved canine tooth on each side of the enlarged row in the lower jaw. *Fins*—the first dorsal about half as high as the body below it, lower than the second which equals the height of the body: pectoral as long as the head: ventrals reach two-thirds of the distance to the base of the anal: caudal pointed. *Scales*—ctenoid, they extend forwards to the snout and on to the sides of the head: about 10 rows before dorsal fin, eight rows between the bases of the second dorsal and anal fins. *Colours*—purplish-black, fins blackish: a black ocellus edged with white or yellow on the upper portion of the base of the caudal fin.

Habitat.—Seas of India to China and Japan: the specimen figured (life-size) is from Madras.

6. Gobius macrostoma.

Gobiopsis macrostomus, Steind. Sitz. Wien, Acad. 1860, xlii, p. 291, t. i, f. 6.
Gobius macrostoma, Günther, Catal. iii, p. 548.

B. v, D. 6/11, A. 10, L. l. 33.

Length of head from $3\frac{2}{3}$ to $3\frac{3}{4}$, height of body $7\frac{1}{2}$ in the total length. *Eyes*—diameter $6\frac{3}{4}$ in length of head, 1 to $1\frac{1}{3}$ diameters apart. Head depressed, broader than high. Cleft of mouth extending to behind the posterior margin of the orbit. *Teeth*—an outer enlarged row: canines present. *Scales*—cycloid anteriorly, ctenoid posteriorly. *Fins*—spines of first dorsal flexible with filamentous terminations, but not so high as the body, soft dorsal higher than the spinous, or than the body, the two dorsal fins at a short distance apart. Pectorals $5\frac{3}{4}$ in the total length. Caudal rounded. *Colours*—vertical fins with dark streaks.

Habitat.—Bombay.

7. Gobius viridipunctatus, Plate LXI, fig. 4, LXIII, fig. 4 (*abnormal*), and LIX, fig. 5 (*male.*)

Gobius nuna mottah, Russell, Fish. Vizag. i, p. 41, pl. 52.
Gobius viridipunctatus, Cuv. and Val. xii, p. 62; Jerdon, M. J. L. and Sc. 1851, p. 143; Günther, Catal. iii, p. 24; Day, Fish. Malabar, p. 110.
Gobius venenatus, Cuv. and Val. xii, p. 85; Günther, Catal. iii, p. 38.
Bichu gende, Tam. "Scorpion goby."

B. v, D. 6 | $\frac{1}{10}$, P. 20, V. 1/5, A. $\frac{1}{9}$, C. 15, L. l. 34-38, L. tr. 9.

Length of head $4\frac{1}{4}$ to $4\frac{1}{2}$, of caudal $5\frac{1}{3}$, height of body $4\frac{2}{3}$ to $5\frac{1}{2}$ in the total length. *Eyes*—diameter 1/4 of length of head, rather above 1 diameter from end of snout, and 1/3 of a diameter apart. Head as broad as high, and equalling the length of the head behind the middle of the eyes. Cheeks swollen, having many rows of warts, and also pitted in large specimens: a large open pore in interorbital space. Lower jaw the longer, cleft of mouth oblique, commencing anteriorly opposite the lower edge of the eye: the maxilla reaching to below middle of orbit. *Teeth*—in both jaws villiform, with an external enlarged row in the premaxillaries, and two or four canines; in the lower jaw there are from 12 to 16 enlarged teeth, the outer of which is a recurved canine, likewise there are from two to four canine-like teeth in the internal row above the symphysis, and some of the internal row laterally are conical. *Fins*—dorsal spines moderately flexible and with short filamentous endings, its height 2/3 that of the body: the second dorsal and anal vary considerably, as seen in plates 61, fig. 4, and 59, f. 5, which show the two extremes, the last ray may reach only 2/3 of the way to the caudal, or even be lengthened to beyond the commencement of that fin. Pectoral as long as the head without the snout. Caudal rounded. *Scales*—ctenoid, smallest anteriorly, about 32 rows existing between the dorsal fin and hind edge of the orbit, a few on the upper portion of the opercle. *Colours*—olive, with a series of four or five large badly defined blotches along the sides: many scales with a light centre, which in life is of an emerald green colour; dorsals dark at their bases, usually having light edges with a dark basal band. Ventral, anal, and caudal gray, the last with a light upper edge.

Plate 61, fig. 4 (life-size from Bombay) is *G. venenatus*, Cuv. and Val.: plate 59, f. 5, is *G. viridipunctatus*, C. V. from Madras: plate 63, fig. 4, is a curious abnormal form showing a deficiency of two anal rays.

Habitat.—Sind, through the seas of India, it is most common at Bombay and Madras, up to at least 5 inches in length.

8. Gobius ocellatus, Plate LXI, fig. 7.

Day, Proc. Zool. Soc. 1873, p. 107.

B. v, D. 6 | $\frac{1}{10}$, P. 20, V. 1/5, A. $\frac{1}{10}$, C. 12, L. l. 33, L. tr. 8.

Length of head $4\frac{1}{3}$ to $4\frac{1}{2}$, of caudal 5 to 6, height of body 6 to 7 in the total length. *Eyes*—somewhat superior, diameter 5 to 6 in the length of head, $1\frac{1}{2}$ diameters from end of snout, and 1 apart. Head slightly broader than high, its greatest width being equal to the length of its postorbital portion, the summit of which is somewhat flat and snake-shaped. No occipital crest, nor warts on the head: a pair of short barbels under the symphysis of the lower jaw. Cleft of mouth somewhat oblique, commencing opposite the middle of the eye: the lower jaw a little the longer: the posterior extremity of the maxilla extends to beneath the anterior margin of the orbit. *Teeth*—several rows in both jaws, an enlarged outer one in the mandibles, the external of which on either side is a moderately or small recurved canine: outer row in premaxillaries likewise enlarged, and a lateral canine in large specimens. *Fins*—the two dorsals not widely separated, the distance of the first dorsal from the orbit equals the distance from the snout to the base of the pectoral fin, its second spine is elongated in some specimens, being nearly as long as the head, last dorsal ray divided to its base. Pectoral rays silk-like, second dorsal and anal of about equal development and highest posteriorly: caudal wedge-shaped: ventral reaches half way to the vent. *Scales*—ctenoid on the body, cycloid on the head, they are much smaller anterior to the dorsal fin than posterior to it: they cover the cheeks and opercles, and on the top of the head as far as the snout: are in rather irregular rows, eight being between the origin of the second dorsal and anal fins, where they are angular: about 28 rows before the dorsal fin. *Colours*—olive, a dark green spot above the upper margin of the opercle, about six indistinct blotches along the sides: dorsal and caudal fins stained with dark, and having some indistinct spots or bars:* a yellow ocellus, with a black centre, at the top of the caudal fin in its last half: anal whitish, basal half covered with fine black dots: ventrals yellow.

Habitat.—Bombay and Sind, to 6 inches in length. The specimen figured (life-size) is from Bombay.

9. Gobius Masoni, Plate LXI, fig. 6.

Day, Proc. Zool. Soc. 1873, p. 107.

B. vii, D. 6 | $\frac{1}{10-11}$, P. 19, V. 1/5, A. $\frac{1}{9}$, C. 12, L. l. 28, L. tr. 10.

Length of head $4\frac{1}{3}$, of caudal 5 to $5\frac{1}{2}$, height of body 5 in the total length. *Eyes*—somewhat superior, diameter $5\frac{1}{2}$ to 6 in the length of head, $1\frac{1}{2}$ diameters from end of snout, and 1 to $1\frac{1}{4}$ apart. Profile of head bluntly rounded, its greatest width equalling its length excluding the snout, its height a little more: cleft of mouth oblique, commencing opposite lower edge of eye: lower jaw anterior, the posterior extremity of the maxilla extends to below the middle of the orbit. Numerous rows of fine wart-like glands along the opercles, nape, and mandibles. *Teeth*—in villiform rows in both jaws, there is an external enlarged row in the upper jaw, with two large canines: from 12 to 15 also enlarged in front of the lower jaw, on either side of the outer row is a very large recurved canine. *Fins*—first dorsal low, its spines filiform, and the longest about half the height of the body below it: the second dorsal rays increase in length posteriorly: pectoral destitute of silk-like rays: caudal wedge-shaped. *Scales*—ctenoid, before the first dorsal fin there are 25 rows, anterior to which they are rounded and smaller than those in the remainder of the body, where they are angular: none on the cheeks, a few along the upper margin of the opercles, superiorly they do not extend so far forwards as to above the posterior margin of the orbit: 10 rows between the origin of the second dorsal and anal fins. *Air-vessel*—large. *Colours*—olive, with numerous brilliant blue spots on the nape and behind the pectoral fin: some blackish ones along the sides. Dorsal, anal, ventral, and caudal black: pectoral yellow, margined with black.

Habitat.—Bombay, to 4 inches in length.

10. Gobius cyanosmos, Plate LXI, fig. 5.

Bleeker, Blen. en Gob. p. 25; Günther, Catal. iii, p. 39.
Gobius setosus, Jerdon, M. J. L. and Sc. 1851, p. 143 (not Cuv. and Val.).
Acentrogobius cyanosmos, Bleeker, MSS.

B. v, D. 6 | $\frac{1}{10}$, P. 18, V. 1/5, A. 10, C. 11, L. l. 28-30, L. tr. 8.

Length of head $4\frac{1}{2}$, of caudal $5\frac{1}{2}$, height of body $6\frac{1}{4}$ in the total length. *Eyes*—somewhat superior, diameter 1/5 to 1/6 of length of head, $1\frac{1}{3}$ diameters from end of snout, and 1/2 a diameter apart. Greatest width of head 2/3 of length, height equals its length without the snout. Cheeks swollen. No warts on cheeks, no crest on nape, nor tentacles above the orbit. The orifice of a canal behind posterior-inferior angle of eye. Mouth anterior, oblique, commencing opposite the lower edge of the eye, jaws of equal length, the maxilla

* Specimens from Sind are more barred than are those from Bombay.

extends posteriorly to below the anterior third of the orbit. *Barbels*—below the symphysis of the mandible are a short pair. *Teeth*—in villiform rows in both jaws, with an outer enlarged one in both, the anterior 10 in the premaxillaries being large and canine-like, the outer 10 or 12 in the lower jaw are also enlarged, but not to the same size as in the upper jaw, the external one on either side is a recurved canine. *Fins*—dorsal spines, especially the second and third, filiform and prolonged far beyond the membrane: rays increase in length to the last which reaches to the base of the caudal fin, and is as high as the body, it is divided to its base. Pectoral as long as the head excluding the snout. Anal similar to soft dorsal. Caudal wedge-shaped or rather rounded. *Scales*—small, rounded, and cycloid anteriorly: about 20 rows existing anterior to the dorsal fin, none on the head; those on the remainder of the body are angular and feebly ctenoid, eight rows between the second dorsal and anal fins. *Colours*—olive, many of the scales with light bluish spots, a deep blue spot on the shoulder, second dorsal and anal dark, each with a reddish outer edge: ventral and last two-thirds of caudal gray.

A beautifully finished coloured drawing of this species* exists amongst Sir W. Elliot's collection, and was named by Jerdon as above.

Habitat.—Seas of India to the Malay Archipelago, the specimen figured (life-size) is from Madras.

11. Gobius criniger, Plate LXII, fig. 2.

? Gobius nebulosus, Forsk. p. 24; Bl. Schn. p. 72; Cuv. and Val. xii, p. 84.

Gobius criniger, Cuv. and Val. xii, p. 82; Cantor, Catal. p. 184; Bleeker, Banka, p. 453; Richards. Erebus and Terror, p. ii, pl. i, figs. 3 and 4; Günther, Catal. iii, p. 29; Day, Fish. Malabar, p. 111.

Gobius brevifilis,† Cuv. and Val. xii, p. 90; Day, Proc. Zool. Soc. 1867, p. 940.

Gobius Krefftii, Steind. Verh. z. b. Ges. Wien, 1867, p. 326.

Gobius caninus, Günth. and Playfair, Fish. Zanz. p. 71, pl. ix, f. 1 (not Cuv. and Val.).

B. v, D. 6 | 10, P. 19, V. 1/5, A. 10, C. 13, L. l. 26-32, L. tr. 12-13.

Length of head 4, of caudal $5\frac{1}{2}$, height of body $4\frac{1}{2}$ in the total length. *Eyes*—diameter $3\frac{1}{3}$ to 4 in the length of head, 1 diameter from end of snout, and 1/2 a diameter apart. Snout obtuse: jaws of about the same length anteriorly. Cleft of mouth oblique, commencing anteriorly opposite the middle of the eyes, the depth of its cleft equalling the width of its gape: the maxilla reaches to below front edge or first third of the eye. Greatest width of head equals its height, or its length excluding the snout. Several rows of fine warts across the cheeks, opercles, upper surface of head, and nape of neck: an open pore between the eyes. *Teeth*—in several villiform rows in both jaws, an outer enlarged row in anterior portion of the lower jaw, the outer of which is a small recurved canine: an anterior enlarged row in premaxillaries. *Fins*—the two dorsals with a narrow interspace between their bases, and of about the same height or 1/6 of the total length, the second and third spines often with filamentous terminations: last dorsal ray divided to its base. Pectoral as long as the head excluding the snout, and of similar length to the ventral. Caudal rounded. *Scales*—ctenoid, none on the head nor in front of base of first dorsal fin. *Colours*—pale ochreous: head, body, dorsal, and caudal fins irregularly spotted and blotched with black: caudal and anal with dark edges.

This is "*Gobius* ——," Jerdon, M. J. L. and Sc. 1851, p. 143.

Habitat.—East coast of Africa, seas of India to the Malay Archipelago and beyond. The specimen figured (life-size) is from Madras, where it is common all the year round in the sea and backwaters.

12. Gobius puntang, Plate LXII, fig. 1.

Bleeker, Nat. Tyds. Ned. Ind. iii. p. 692 (? ii, p. 486): Günther, Catal. iii, p. 19.

Gobius puntangoides, Bleeker, Ceram, iii, p. 242.

Gobius Andamanensis, Day, Proc. Zool. Soc. 1870, p. 691.

B. v, D. 6 | $\frac{1}{10}$, P. 17, V. 1/5, A. 10, C. 11, L. l. 28-29, L. tr. 8-9.

Length of head $4\frac{1}{2}$ to $5\frac{1}{2}$, of caudal $3\frac{1}{3}$, height of body $4\frac{3}{4}$ to $5\frac{3}{4}$ in the total length. *Eyes*—diameter 1/4 of length of head, $1\frac{1}{2}$ diameters from end of snout, and 1/2 a diameter apart. Jaws of the same length anteriorly. Upper profile of head rounded, a considerable rise from the snout to the forehead. Greatest width of head two-thirds and its height three-fourths of its length. Cleft of mouth very slightly oblique, the maxilla reaches to below the middle of the orbit: two open pores between the orbits. *Teeth*—in several villiform rows, the outer row in the premaxillaries rather enlarged, as is also the external row in the lower jaw which ends laterally in a small canine. *Fins*—dorsal spines flexible, with filamentous terminations, the first three

* I am unable to find any record that *Gobius caninus*, C.V. has been taken in India unless it is this species. The type has L. l. 33, L. tr. 8, and 18 rows of scales anterior to the dorsal fin, which are not much smaller than those on the body. Width of head 3/4 its height. Glands on head, but no scales. It appears to have been found in the Malay Archipelago and beyond, but it is by no means improbable that it frequents the seas of India.

G. grandinosus, Val. Voy. Bonito, Poiss. p. 177, pl. 5, f. 4, is very similar, it has D. 6 | 11, A. 10, L. l. 30, L. tr. 9. Head $4\frac{3}{4}$, caudal and body each $5\frac{1}{2}$ in the total length. *Eyes*—diameter 1/4 of head, $1\frac{1}{4}$ diameters from end of snout, and 1/4 apart. Width of head equals its height. Lines of warts on scaleless cheeks. *Teeth*—one or two recurved but not very large canines on either side of lower jaw. *Scales*—25 rows of small ones between dorsal and occiput, a few on upper edge of opercle.

† Bleeker, "Fishes of Madagascar," p. 77, observes "*Gobius auchenotænia*, Bleeker=*Gobius brevifilis*, C.V. ?"

the longest and much more than the second, the hind rays of which equal the height of the body and reach the base of the caudal: anal similar to second dorsal. Pectoral as long as the head and half longer than the ventral. Caudal pointed, its central rays being the longest. *Scales*—ctenoid, extending as far forwards as the orbits, also on the cheeks and opercles. Eleven rows anterior to the dorsal fin: nine between the origins of the second dorsal and anal fins. *Colours*—olive, spotted all over with rusty, fin-rays yellow, barred and dotted with purplish red. Anal with a yellow margin and sometimes with transverse purplish-red streaks.

Habitat.—Andamans to the Malay Archipelago: it appears to prefer brackish water. The specimen figured (life-size) is from the Andamans. Genus *Acentrogobius*, Bleeker, MSS.

13. Gobius Bleekeri, Plate LXII, fig. 5.

Day, Proc. Zool. Soc. 1868, p. 195.

B. v, D. 6 | $\frac{1}{9}$, P. 16, V. 1/5, A. 1/8, C. 13, L. l. 32, L. tr. 11.

Length of head 1/5, of caudal 1/6, height of body 1/5 of the total length. *Eyes*—directed upwards and slightly outwards, closely approximating superiorly, diameter $3\frac{3}{4}$ in length of head, 3/4 of a diameter from end of snout. Height of head equal to its length excluding the snout. Lower jaw the longer, cleft of mouth oblique, commencing opposite the middle of the eyes, the maxilla reaches to beneath the anterior half of the orbit. *Teeth*—in villiform rows having an external enlarged row in either jaw, with the outer on either side in the mandibles being a recurved conical canine. *Fins*—dorsal spines slender, with filamentous prolongations, and higher than the second dorsal. Pectoral 1/4 longer than the head, the ventral does not reach the origin of the anal: anal and second dorsal similar: caudal wedge-shaped. *Scales*—ctenoid, extending as far forwards as the posterior margin of the orbit, none on the cheeks or base of pectoral, sixteen rows anterior to the dorsal fin which are rather smaller than those on the remainder of the body. Eleven rows between the bases of the second dorsal and anal. *Colours*—olivaceous, clouded with darker blotches and irregular spots, very fine black spots on the scales: first dorsal dusky in its upper half, with a large bluish spot extending from the first to the fourth spine, and a light mark along its base from thence to the end of the fin, the spines orange: second dorsal studded with black points most numerous towards its base, its first half minutely edged with white, and some blue spots on its posterior half: anal covered with minute black points: pectoral orange, with a blue ocellus on the upper half of its base, its lowest ray deep blue: ventral blackish. Caudal nearly black, having from three to four rows of bluish-white spots between each ray.

Habitat.—Madras, to $2\frac{1}{5}$ inches long. Genus *Acentrogobius*, Bleeker, MSS.

14. Gobius zonalternans.

B. v, D. 6 | $\frac{1}{9}$, P. 17, V. 1/5, A. $\frac{1}{9}$, C. 13, L. l. 27, L. tr. 6.

Length of head $4\frac{1}{2}$, of caudal $4\frac{1}{4}$, height of body $6\frac{1}{2}$ in the total length. *Eyes*—diameter $3\frac{1}{4}$ in length of head, 1/2 a diameter from end of snout, and 1/6 of a diameter apart. Greatest width of head equals half its length, and its height equals its length excluding the snout. Lower jaw slightly the longer, the maxilla reaches to below the first third of the eye. No warts or barbels on the head. *Teeth*—in several cardiform rows, directed rather inwards, and having an external enlarged row, the outer of which in the lower jaw is a large recurved canine. *Fins*—spines of first dorsal very thin having filamentous terminations, and much higher than the body: last dorsal and anal rays long and reach the caudal fin. Pectoral and ventral reach the anal. Caudal pointed. *Scales*—cycloid, very small ones before the first dorsal fin, and not extending to so far as the hind edge of the eyes. *Colours*—a large blue spot surrounded with black on the opercle: body with brown bands going from the dorsal to the abdominal surface, they are of an angular form, the angle directed backwards: a dark band over the free portion of the tail just before the base of the caudal fin, which has a black basal band, whilst its outer half is gray. First dorsal with a white band along its base, and a dark blotch between the last dorsal spines. Other fins dark gray.

Habitat.—Madras: two specimens up to $1\frac{3}{4}$ inches, from brackish water (Adyair river).

15. Gobius biocellatus, Plate LXIII, fig. 8.

Cuv. and Val. xii, p. 73; Günther, Catal. iii, p. 20; Day, Proc. Zool. Soc. 1868, p. 154.
Gobius Celebicus, Cuv. and Val. xii, p. 74; Bleeker, Bant. p. 318.
Gobius sublitus, Cantor, Catal. p. 181; Günther, Catal. iii, p. 24.
Cephalogobius sublitus, Bleeker, Gobioides, p. 32=*Glossogobius sublitus*, Bleeker MSS.

B. v, D. 6 | $\frac{1}{9}$, P. 19, V. 1/5, A. $\frac{1}{8}$, C. 15, L. l. 28-30, L. tr. 7-8.

Length of head 4 to $4\frac{1}{2}$, of caudal 6, height of body 6 in the total length. *Eyes*—high up, diameter 1/4 to 1/5 of length of head, 1 to $1\frac{1}{4}$ diameters from end of snout, 1/4 of a diameter apart. Height and breadth of head equal, and as long as the head behind the middle of the eyes. Cleft of mouth rather oblique, lower jaw the longer: the maxilla reaches to below the middle of the orbit, nearest point from eye to angle of preopercle 1/2 longer than the snout. A large open pore in the posterior third of the interorbital space. Several rows of fine warts on the cheeks. *Teeth*—several cardiform rows in the centre of the upper jaw directed inwards, becoming two laterally, the outer one enlarged: a narrow cardiform band in the lower jaw, also directed inwards and becoming two rows laterally, irrespective of these is an outer enlarged row and about ten enlarged teeth in front of the lower jaw, the external of which is slightly recurved and canine-like in large

specimens. *Fins*—first dorsal spines weak, the fifth slightly the longest, the first as high as the second dorsal, the last ray of which is as long as the head. Pectoral as long as the head excluding the snout: ventral extends beyond the vent. *Scales*—ctenoid, 18 to 20 rows between orbit and base of dorsal fin: none on cheeks: some on opercle, much smaller than those on the rest of the body, where they are angular. *Colours*—these vary, generally grayish-brown, with some large irregular blotches along the sides, and a slight brownish line along the centre of each row of scales: under surface of cheeks and jaws lineated with circuitous brownish lines. Dorsal fin generally yellowish, with a grayish tinge, and having several irregular whitish lines along its lower half, and usually also a black blotch with a white edge between its fifth and sixth spines: second dorsal with several rows of irregular white spots: pectoral, ventral, and anal grayish, the last with some white dots: caudal dark gray, with some lines of dark spots.

Habitat.—Coasts of India as high as Sind, and to the Malay Archipelago. Genus *Glossogobius*, Bleeker MSS.

16. Gobius Madraspatensis, Plate LXII, fig. 3.

Day, Proc. Zool. Soc. 1868, p. 152.

B. v, D. 6 | $\frac{1}{9}$, P. 17, V. 1/4, A. $\frac{1}{9}$, C. 13, L. l. 28-29, L. tr. 7.

Length of head 5 to $5\frac{1}{4}$, caudal $5\frac{1}{4}$ to 6, height of body 4 to $4\frac{1}{2}$ in the total length. *Eyes*—their upper margin near the profile, diameter 1/4 of length of head, 2/3 of a diameter from end of snout, 1/4 of a diameter apart. Width of head equals its postorbital length: height of head equals its length without the snout. Some rows of warts across the cheeks: two open glands in the interorbital space. Cleft of mouth oblique, commencing opposite the upper third of the eye, the lower jaw the longer, the maxilla extending to beneath the anterior margin of the orbit. *Teeth*—villiform in both jaws, with an outer enlarged row in the upper, and about 14 enlarged ones anteriorly in the lower jaw, ending in a large external recurved canine. *Fins*—dorsal spines flexible, the first with a filamentous termination, the fin ending near the commencement of the second dorsal which is rather the highest. Pectoral as long as the head, and of equal length to the ventrals. Anal commences below second or third dorsal ray. Caudal rounded. *Scales*—ctenoid, they extend forwards to nearly as far as the posterior margin of the orbit, and are smaller on the nape than on the remainder of the body: none on the head, about 12 rows anterior to the base of the dorsal fin: seven rows between the origin of the second dorsal and anal. *Colours*—olivaceous, with irregular, ill defined brownish blotches and dots. From five to eight very narrow vertical black lines pass from the back to the abdomen, commencing opposite the base of the ventrals and terminating about the middle of the anal. Fins grayish, first dorsal with two rows of black blotches, and sometimes a black blotch covering one-third of the membrane between the fifth and sixth spines, which may be continued to the end of the fin: second dorsal irregularly blotched and dotted. Pectoral and anal unspotted. Ventrals tipped with black. Caudal minutely dotted in rows.

Habitat.—Madras backwaters, up to about 3 inches in length. Genus *Acentrogobius*, Bleeker MSS.

17. Gobius Neilli, Plate LXII, fig. 4.

Day, Proc. Zool. Soc. 1868, p. 152.

B. v, D. 6 | $\frac{1}{9}$, P. 17, V. 1/5, A. 9, C. 13, L. l. 28, L. tr. 7.

Length of head 2/7, of caudal 1/5, height of body 1/4 of the total length. *Eyes*—directed upwards and slightly outwards, diameter 2/7 of length of head, 1 diameter from end of snout, and less than 1/6 of a diameter apart. Head as broad as high, equalling its length behind the middle of the eye. Cheeks swollen. No warts or barbels but an open pore in front of the interorbital space and another at the posterior inferior angle of the eye: cleft of mouth very oblique, commencing opposite the upper third of the eye: the posterior extremity of the maxilla extends to beneath the anterior third of the orbit. *Teeth*—in two or three rows in either jaw, an outer row of enlarged ones anteriorly in the upper, and a much larger outer series of twelve or fourteen in the lower jaw, the external of which on either side is a large recurved canine. *Fins*—first dorsal spines flexible and prolonged, the termination of the second in the adult being filamentous. Pectoral as long as the head: ventrals reach the anal: caudal somewhat pointed. *Scales*—in regular rows, ctenoid, anteriorly they extend (in about 12 rows, the first eight of which are small), three-fourths of the distance from the first dorsal to the orbits: seven rows between the bases of the second dorsal and anal: none on the head, gill-opening extending inferiorly to rather below the base of the pectoral fin. *Colours*—superiorly ochreous, becoming dirty white on the abdomen, cheeks, head, and upper two-thirds of the body being blotched over with various sized rusty brown dots of irregular shape, forming oblique bands on the head. Pectoral and ventrals unspotted. First dorsal with a black mark between its first and fifth spine to about half the height of the fin, above this it is yellow, the ends of the spine black, last two spines brown spotted. Second dorsal brown externally, with a longitudinal yellow and black band dividing it from the lower three-fourths of the fin which is spotted with light brown: caudal barred with eight or nine chestnut spots.

Habitat.—Madras, up to $3\frac{1}{4}$ inches in length. Genus *Acentrogobius*, Bleeker MSS.

18. Gobius melanosticta, Plate LXIII, fig. 2.

B. v, D. 6 | $\frac{1}{8-9}$, P. 17, V. 1/5, A. 9, C. 13, L. l. 24, L. tr. 7.

Length of head 5 to $5\frac{1}{4}$, of caudal $4\frac{1}{2}$, height of body $4\frac{1}{4}$ in the total length. *Eyes*—diameter 1/3 of length of head, 1/2 diameter from end of snout, and 1/3 apart. Greatest width of head equals its height, or its

length excluding the snout. Upper jaw slightly the longer: cleft of mouth oblique, commencing opposite the lower edge of the eye: the maxilla reaches to below the last third or middle of the eye. No barbels. Scales cover opercles. *Teeth*—in villiform rows with an outer enlarged series, the outer tooth of the enlarged row in the lower jaw a small recurved canine. *Fins*—first dorsal spines with filamentous terminations, the fin rather higher than the second, the last rays of which latter equals the height of the body. Pectoral as long as the head: ventral reaches half way to the vent. Caudal rounded. *Scales*—scarcely ctenoid, about 9 rows between the dorsal fin and the hind edge of the eyes. *Colours*—light brown, most of the scales on the body with a dark spot or vertical mark; a dark blotch on the opercles, and another below the eye. Dorsal and caudal fins with numerous dark spots forming bars. Pectoral with a dark mark at its base.

Habitat.—Backwaters of Madras, up to 2 inches in length.

B. *No lateral recurved canine in the lower jaw: dorsal spines flexible.*

19. Gobius cristatus, Plate LXII, fig. 8.

Euctenogobius cristatus, Day, Proc. Zool. Soc. 1873, p. 109.

B. v, D. 6/14, P. 21, V. 1/5, A. 14, C. 13, L. l. 50-60, L. tr. 11-12.

Length of head $5\frac{1}{2}$, of caudal 3 to 4, height of body 6 in the total length. *Eyes*—rather superior, with a very narrow and concave interorbital space, diameter 1/4 of length of head, 1 diameter from end of snout. Greatest width of head equals its length behind the middle of the eyes, whilst its height is a little more. Cleft of mouth oblique, lower jaw the longer, the maxilla reaches to below the middle of the orbit, the width of the gape of the mouth is 1/4 less than the length of its cleft. Several rows of fine warts across the cheeks. Barbels absent, no tentacle at the orbit. A low black-stained crest extends from the nape to the base of the first dorsal fin. *Teeth*—in a single row in the upper jaw, in above two in the lower, the outer of which is directed somewhat outwards. No canines. Inferior pharyngeal bones in close juxtaposition along the median line, the two have a T-shape, and a single row of teeth. *Fins*—all the spines in the first dorsal flexible and elongated beyond the membrane: last rays of second dorsal the longest in the fin, the two fins are close together at their bases. Anal similar to second dorsal: caudal pointed and elongated. Ventral reaches the vent. *Scales*—cycloid, in irregular rows and very small anterior to the second dorsal fin: about 18 rows anterior to the dorsal fin. *Colours*—olivaceous: one or two black spots on the posterior-superior angle of the eye: a light ocellus having a brown edge at the base of the pectoral fin: body blotched and spotted: some black bars on upper half of dorsal, and a badly defined violet ocellus edged with yellow on its last ray: caudal spotted in its upper half.

The Madras specimens differ somewhat in having a light edge to the anal fin, ventral dark gray, and no ocellus on the dorsal, whilst the caudal fin is longer: it has a dark spot under the eye. Doubtless this species is very similar to *G. tentacularis*, and although it wants the tentacle on the eye, it has a black spot at the same place. Genus *Oxyurichthys*, Bleeker MSS.

Habitat.—Madras and Bombay, where in the month of March they were breeding.

20. Gobius tentacularis, Plate LXIV, fig. 4.

Cuv. and Val. xii, p. 128; Bleeker, Java, ii, p. 434; Günther, Catal. iii, p. 48.
Gobius macrurus, Bleeker, Blenn. en Gob. p. 35.
Oxyurichthys tentacularis, Bleeker, En. Spec. p. 120.

B. v, D. 6 | $\frac{1}{12}$, P. 20, V. 1/5, A. $\frac{1}{13}$, C. 15, L. l. 60, L. tr. 10.

Length of head $5\frac{1}{2}$ to $6\frac{1}{2}$, of caudal $3\frac{2}{3}$, height of body 7 to 8 ($9\frac{1}{2}$) in the total length. *Eyes*—high up and close together, diameter $3\frac{3}{4}$ in length of head, 1 diameter from end of snout. Width of head equals its length behind the middle of the eye: its height equals its length excluding the snout. Snout somewhat obtuse and rounded, cleft of month oblique, commencing opposite the lower edge of the orbit, lower jaw the longer, the maxilla reaches to below last third of eye. A simple tentacle above the posterior third of the eye, and about 2/3 of the length of the orbit. *Teeth*—in a single row of rather pointed ones in the premaxillaries: in two or three rows in the lower jaw without any canines. *Fins*—dorsal spines flexible, extending far beyond the membrane and equal to the height of the body, second dorsal about equally high, the distance between the bases of the two fins is not so much as one diameter of the eye. Pectoral as long as the head, and 1/4 longer than the ventral. Anal commences below origin of second dorsal: caudal acutely pointed. *Scales*—ctenoid in the posterior part of the body, they extend forward nearly to the eyes, none on the crest going from the base of the first dorsal fin or on the head, there are about 20 rows anterior to the dorsal fin. They are very much smaller anterior to the second dorsal fin, and on the breast and chest before the anal fin. An anal papilla. *Colours*—dull green, with some reddish spots. First dorsal with four to six narrow bands of horizontal spots, and six or eight along the second dorsal. Caudal gray, with some spots on its upper half. Anal gray, with a narrow white band at its base.

Habitat.—Seas of India to the Malay Archipelago. The specimen figured (life-size) is from the Andamans.

21. Gobius acutipinnis, Plate LXI, fig. 2.

Cuv. and Val. xii, p. 80; Günther, Catal. iii, p. 44; Day, Fish. Malabar, p. 112.
Gobius setosus, Cuv. and Val. xii, p. 81.

Mang-moo-goo-da-lah-dah, Andam.

B. v, D. 6 | $\frac{1}{10-11}$, P. 19, V. 1/5, A. $\frac{1}{11}$, C. 19, L. l. 25-28, L. tr. 6-7.

Length of head from 5 to 6, of pectoral $4\frac{1}{2}$ to 5, of caudal 3 to $3\frac{2}{3}$, height of body 5 to 6, of first dorsal 3 to 4, of second dorsal 5 to $5\frac{1}{2}$ in the total length. *Eyes*—diameter $3\frac{1}{4}$ to $3\frac{1}{2}$ in length of head, 1 diameter from end of snout, and 1/6 of a diameter apart. Snout obtuse and rounded: cleft of mouth oblique, its anterior extremity commencing opposite the lower edge of the eye, the width of gape equalling length of cleft. The maxilla reaches to beneath the anterior edge of the eye. Greatest width of head equals its length behind the middle of the eye, whilst its height equals its length excluding the snout. A narrow row of warts across the cheeks, a large opening of mucous canals opposite the posterior inferior angle of the orbit. *Teeth*—villiform in two or three rows in the upper and several in the lower jaw, the outer of which is very slightly enlarged: no canines.* *Fins*—spines of first dorsal weak, with filamentous terminations: last dorsal ray divided at its base. Caudal lanceolate. *Scales*—angular, ctenoid, none on the head or in front of the base of the first dorsal fin. *Colours*—grayish-brown superiorly, becoming dull white beneath: four or five (sometimes more) dull blotches almost forming bands pass from the back down the sides: a dark mark at the base of the caudal fin. A brown band goes from the corner of the eye down the cheeks to behind the angle of the mouth. Four lines of spots or bands along both dorsal fins: some obscure brownish bands sometimes present on the caudal, especially on its central rays; the fins generally dark gray with a light outer edge. Pectoral, ventral, and anal stained of a slate colour.

Habitat.—Seas of India to the Andaman islands, is very common up to $3\frac{1}{2}$ inches in length. The specimen figured (life-size) is from Madras. Genus *Acentrogobius*, Bleeker MSS.

22. Gobius striatus, Plate LXII, fig. 6.

Euctenogobius striatus, Day, Proc. Zool. Soc. 1868, p. 272 c. fig.
Coondallum, Tam.: *Mahturi*, *Naolli (young)*, Ooriah.

B. v, D. 6 | $\frac{1}{10}$, P. 15, V. 1/5, A. 10, C. 15, L. l. 56-60, L. tr. 14, Vert. 11/16.

Length of head 4 to $4\frac{1}{4}$, of caudal 5 to $5\frac{3}{4}$, height of body $5\frac{1}{2}$ to $6\frac{1}{2}$ in the total length. *Eyes*—not prominent, directed upwards and outwards, diameter 1/6 to 1/7 of length of head, 2 to $2\frac{1}{2}$ diameters from end of snout, and 1/2 a diameter apart. Body elongated: sides compressed. Snout elongated, cheeks inflated: head 4/7 as broad as long, height equals 1/2 of length: no tentacles. Jaws of equal length, or the lower slightly the longer. Cleft of mouth nearly horizontal, the maxilla reaches to nearly below front edge of the eye. *Teeth*—in one row in the upper and in two or three rows in the centre of the lower jaw, becoming one or two laterally, as a rule no canines, but present in one specimen; also on the inferior pharyngeal bones which are of an elongated triangular shape, having a median longitudinal suture. *Fins*—first dorsal spines weak, not filamentous, and 3/4 the height of the body: second dorsal rays of about equal height: last dorsal ray divided to its root, it only reaches 1/2 way to the base of the caudal: caudal slightly rounded. *Scales*—ctenoid, those anterior to the dorsal fin smaller than the rest on the body: none on the cheeks and head: 30 rows between occiput and dorsal fin: 14 rows between the origin of the second dorsal and anal fins. *Colours*—generally light fulvous, with a bluish tinge along the sides, becoming dirty-white beneath: some irregular bands pass from the back towards the middle of the body, also some thin black lines proceed upwards on the abdomen opposite to the anal fin: cheeks glossed with silver: pectoral, ventral and anal whitish-yellow: both dorsals diaphanous, with five or six rows of brown dots: caudal with eight or nine vertical rows of spots in its upper half or two-thirds.

Dr. Bleeker, who has been good enough to go through my plates of Gobies, suggests that this species of Genus *Awaous*, is very closely allied to, if not identical with, *Gobius stamineus*. Val. Voy. Bonite, Poissons, p. 179, pl. 5, f. 5, from the Sandwich islands.

A very good coloured figure exists amongst Sir W. Elliot's drawings marked "*Kul Oolavoo*, Tam. Fresh water, *Gobius Russellii*, Russell, pl. 53."

Habitat.—Fresh and backwaters of Madras and Canara.

23. Gobius personatus, Plate LXIII, fig. 6.

Gobius melanocephalus, Bleeker, Blen. en Gob. p. 33.
Gobius personatus, Bleeker, l. c. p. 34, and Nat. Tyds. Ned. Ind. 1851, f. 4.
Gobius grammepomus, Bleeker, l. c. p. 34; Günther, Catal. iii, pp. 64, 554.
Gobius litturatus, (Heck.) Steind. Sitz. Wien Acad. 1861, p. 289, f. 4, 5.
Gobius Stoliczkæ, Day, Proc. Zool. Soc. 1870, p. 692.

B. v, D. 6 | $\frac{1}{10}$, P. 16, V. 1/5, A. $\frac{1}{10}$, C. 12, L. l. 55, L. tr. 14.

Length of head $3\frac{3}{4}$ to 4, of caudal 5 to $5\frac{1}{2}$, height of body $5\frac{1}{2}$ to $6\frac{1}{2}$ in the total length. *Eyes*—diameter 1/6 of length of head, 2 diameters from end of snout, and nearly 1 diameter apart. Greatest width of head equals its length behind the middle of the eyes, its height equals half its length. No warts or tentacles on the head. Cleft of mouth slightly oblique, commencing opposite the lower edge of the eye, upper jaw a little the longer: the maxilla reaches to below the front edge of the eye. *Teeth*—in several fixed rows in the upper jaw,

* In one specimen there is a small canine internally on either side of the symphysis of the lower jaw.

the outer of which is the longer: in many villiform rows in the lower jaw, the outer of which are fine, rather elongated and slightly horizontal. *Fins*—dorsal spines weak, with filamentous terminations as high as the body and equalling the last rays of the dorsal fin, which are the longest and extend to the base of the caudal fin. Pectoral 3/4 of length of head, and 1/4 longer than the ventral. Caudal cut nearly square. *Scales*—ctenoid, those anterior to the dorsal fin in about 22 rows of rounded ones, which are much smaller than those on the body, and extend forwards as far as the eye, some exist on the upper portion of the opercles: those on the body angular. *Colours*—of a light brown, a little darkest along the back and upper surface of the head, a black spot at posterior superior angle of opercle, the head and upper two-thirds of the body with numerous vermiculated black lines and spots, the dorsal fin with three or four rows of spots forming bars, and sometimes a dark mark in its outer half from the fifth spine to the end of the fin. Anal with a white outer edge. Caudal with five or six angular bars or irregularly placed spots.

Habitat.—Seas of India to the Malay Archipelago, apparently preferring brackish waters, as estuaries and backwaters, due to which cause its colours appear subject to considerable variation. The specimen figured (life-size) is from the Andamans. Genus *Awaous*, Bleeker MSS.

24. Gobius Malabaricus.

Day, Proc. Zool. Soc. 1865, p. 27, and Fishes of Malabar, p. 111, pl. vii, f. 2.

B. v, D. 6 | $\frac{1}{10}$, P. 13, V. 1/5, A. $\frac{1}{10}$, C. 13, L. l. 50, L. tr. 9.

Length of head 1/5, of caudal 1/4, height of body 1/5 of the total length. *Eyes*—diameter 1/6 of length of head, 1 diameter from end of snout, 1/2 a diameter apart. Height of head 2/3 of its length, snout obtuse: cleft of mouth oblique, the lower jaw the longer, the maxilla extends backwards to beneath the anterior third of the orbit. *Teeth*—an external enlarged row in either jaw, no canines. *Fins*—dorsal spines weak, not filiform, not quite so long as the second dorsal, the last rays of which reach the base of the caudal, which last is rounded with the middle rays rather the longest. *Scales*—ctenoid, angular, nine rows between the origin of the second dorsal and anal fins, none on the head. *Colours*—light brown, with irregular dusky bands on the back and sides, a dark band descends from the eye, and some brown blotches about the head. A deep black crescentic mark on the first dorsal fin, commencing between the second and third spines and continued to the last, above this is a white curved band bordered with black. Second dorsal, anal, and caudal brownish, barred with several rows of darker spots.

Gobius neglectus, Jerdon, M. J. L. and Sc. 1849, p. 148, may be this species, or *Gobius striatus*, p. 292. Neither *Gobius Malabaricus* or *G. striatus*, so far as I have observed, ever attain to nearly eight inches in length as *G. neglectus* is said to, irrespective of which Jerdon considered *striatus* as *G. Russellii*, C. V. (See p. 295.)

Habitat.—Backwaters in Madras, also in some of the rivers of Malabar, to about 4 inches in length.

25. Gobius planifrons, Plate LXIII, fig. 9.

Day, Proc. Zool. Soc. 1873, p. 108.

B. v, D. 6 | $\frac{1}{10}$, P. 19, V. 1/5, A. 10, C. 13, L. l. 46, L. tr. 15.

Length of head $4\frac{1}{2}$, of caudal $5\frac{1}{2}$, height of body $5\frac{1}{2}$ in the total length. *Eyes*—very high up, diameter 1/6 of length of head, 1 diameter from end of snout, and $1\frac{1}{2}$ apart. Greatest width of head equals its length excluding the snout, and its height equals half its length. Upper surface of head flat. Cleft of mouth horizontal, with the jaws anteriorly of about the same length; width of the gape equals about half the length of the head, the maxilla reaches to two diameters of the orbit behind its posterior edge. Fine tentacles near the nostrils, and rows of warty glands along the scaleless head. *Teeth*—in numerous villiform rows, the outer of which are a little enlarged: no canines. *Fins*—first dorsal low, about half as high as the body beneath it: the second higher. Pectoral as long as the head without the snout: ventral reaches half way to the anal: caudal rounded. Anal papilla rather large. *Scales*—those on the body finely ctenoid, about 18 rows before the dorsal fin: the rows on the body very irregular, anteriorly they reach to half way between the first dorsal and the hind edge of the eye. *Colours*—olive, fins very dark gray, second dorsal spotted: a black blotch at the base of the pectoral.

Habitat.—Bombay, where the specimen figured (life-size) was obtained.

26. Gobius elegans.

(Kuhl and v. Hass.) Cuv. and Val. xii, p. 58; Bleeker, Nat. Tyds. Ned. Ind. 1851, i, f. 10; Cantor, Catal. p. 179; Gunther, Catal. iii, p. 18.

B. v, D. 6 | $\frac{1}{10}$, P. 18, V. 1/5, A. $\frac{1}{9}$, C. 18, L. l. 36, L. tr. 9.

Length of head 1/5, height of body 1/6 of the total length. Snout obtuse. *Teeth*—small and of equal size. *Fins*—first dorsal rather lower than the second, which equals that of the body. Caudal rounded. *Colours*—buff, with a tinge of olive, minutely dotted with brown: the upper half of the sides with three or four indistinct lines, each formed by a series of very short brown streaks, beneath which are a series of indistinct brown spots: a blackish spot at the posterior margin of the orbit: a second at the upper part of the root of the pectoral fin, and a third at the lower part of the root, spreading on to the gill-membrane. Near the lower part of the root of the pectoral is a faint trace of a fourth brown spot. The membranes of the fins are of a very pale bluish-green, minutely clouded with brown: those of the dorsals, particularly the second, with three

or four indistinct series of blackish spots, and a few similar on the caudal membrane. The rays of the anterior dorsal have two or three series of brown spots. Iris pale greenish-silvery, minutely dotted with brown, (Cantor.)

Habitat.—Bombay to the Malay Archipelago, it appears to be a small marine or estuary species.

27. Gobius ornatus, Plate LXIII, fig. 1.

Gobius ornatus, Rüpp. Atl. Fische, p. 135, and N. W. Fische, p. 137; Günther, Catal. iii, p. 21; Peters, Monats. Akad. Berlin, 1868, p. 263; Day, Proc. Zool. Soc. 1870, p. 691; Kner, Novara Fische, p. 173; Klunz. Verh. z. b. Ges. Wien, 1871, p. 473.

Gobius ventralis, (Ehren.) Cuv. and Val. xii, p. 113.

Gobius interstinctus, Richards. Erebus and Terror, p. 3, pl. 5, fig. 3-6; Bleeker, Amb. and Ceram. p. 275.

Gobius periophthalmoides, Bleek. Nat. Tyd. Ned. Ind. 1851, i, p. 249.

B. v, D. 6 | $\frac{1}{10}$, P. 21, V. 1/5, A. $\frac{1}{8-9}$, C. 13, L. l. 26-28, L. tr. 7.

Length of head 4 to $4\frac{1}{2}$, of caudal 5, height of body 6 to 7 in the total length. *Eyes*—diameter 1/3 to 2/7 of length of head, 1 diameter from end of snout, 1/4 of a diameter apart. Snout obtuse, convex. Head as broad as high, and equalling two-thirds of its length. Jaws of about equal length. Cleft of mouth very slightly oblique, the maxilla reaching to below first third of orbit. *Teeth*—in villiform rows, no canines. *Fins*—first dorsal somewhat lower than the second or than the body. Pectoral as long as the head: caudal rounded. *Scales*—ctenoid, they extend on to the crown of the head, 13 rows before the base of the dorsal fin: seven rows between the bases of the second dorsal and anal fins. *Colours*—green, with numerous oblong brown spots, generally in three or four rows, also yellow dots in the centre of some of the scales: all the fins, except the ventral, dotted with black.

Some specimens in the Calcutta Museum were marked *Gobius maculatus*, Blyth, but I have been unable to ascertain if such a name was ever published. Genus *Acentrogobius*, Bleeker MSS.

Habitat.—Red Sea to the Malay Archipelago, the specimen figured is from the Andamans.

28. Gobius gutum.

Ham. Buch. Fish. Ganges, pp. 50, 366; Cuv. and Val. xii, p. 138.

D. 6 | $\frac{1}{10}$, P. 13, V. 5/5, A. 11, C. 17.

Head small, narrower than the body. *Eyes*—small. Mouth large, the upper jaw the longer. *Teeth*—sharp. *Fins*—pectoral and caudal rounded. *Scales*—ctenoid. *Colours*—greenish, with many black dots clustered into irregular spots resembling clouds in form: dorsal and caudal fins spotted. A figure of this species $2\frac{3}{10}$ inches in length exists amongst Hamilton Buchanan's MSS. drawings at Calcutta.

Habitat.—Lower portion of the Hooghly, to three or four inches in length.

29. Gobius albo-punctatus, Plate LXIII, fig. 7.

Cuv. and Val. xii, p. 57; Blyth, Proc. Asiat. Soc. Beng. 1860, p. 111; Günther, Catal. iii, p. 25; Kner, Novara Fische, p. 174; Klunz. Verh. z. b. Ges. Wien, 1871, p. 473.

? *Gobius nebulo-punctatus*, Rüpp. N. W. Fische, p. 139; Cuv. and Val. xii, p. 58; Klunz. Verh. z. b. Ges. Wien, 1871, p. 472.

Gobius punctillatus, Rüpp. Atl. Fische, p. 138, and N. W. Fische, p. 138.

? *Gobius fuscus*, Rüpp. Atl. Fische, p. 137.

Gobius Padangensis, Bleeker, Blenn. en Gob. p. 249.

Gobius breviceps, Blyth, Proc. Asiat. Soc. Beng. 1858, p. 271.

B. v, D. 6 | $\frac{1}{9}$, P. 21, V. 1/5, A. $\frac{1}{8}$, C. 13, L. l. 35-40, L. tr. 11-12.

Length of head $4\frac{1}{4}$ to $4\frac{3}{4}$, of caudal $4\frac{3}{4}$, height of body $5\frac{1}{4}$ in the total length. *Eyes*—diameter 2/9 to 1/5 of length of head, $1\frac{1}{4}$ diameters from end of snout, and 3/4 of a diameter apart. Greatest width of head equals its length excluding the snout, whilst its height equals its length behind the eye. Cleft of mouth slightly oblique, the maxilla reaching to below the first third of the eye. *Teeth*—in villiform rows in both jaws, the outer row of which is slightly enlarged. No canines. No glands, warts, or barbels on the head. *Fins*—first dorsal lower than, or of equal height to, the second, the anterior rays of which equal the height of the body. Pectoral as long as the head excluding the snout. Ventral does not quite reach the anus. Caudal rounded. *Scales*—those on the nape rounded, cycloid, and in about 20 rows anterior to the dorsal fin, those on the rest of the body feebly ctenoid, and in 11 or 12 rows between the bases of the second dorsal and anal fins. An anal papilla. *Colours*—brownish, irregularly marbled: sides of head and body studded with white spots: dorsal and caudal grayish, dotted with black, forming three rows on the first and second dorsal fins: the other fins unspotted. In some instances the dorsal, caudal, and pectoral are blackish, with a row of white dots.

Habitat.—Red Sea, Andamans, Mauritius, Feejee islands, and Port Essington. The specimen figured (life-size) is from Port Blair.

30. Gobius giuris, Plate LXVII, fig. 1.

Gobius korah mottah, Russell, Fish. Vizag. i, p. 40, pl. 50.

Gobius koku, Russell, l. c. p. 41, pl. 51.

Gobius bullee kokah, Russell, l. c. p. 42, pl. 53.

Gobius giuris, Ham. Buch. Fish. Ganges, pp. 51, 366, pl. 33, fig. 15; Cuv. and Val. xii, p. 72; Bleeker, Blenn. en Gob. p. 24; Günther, Catal. iii, p. 21; Peters, Monats. Akad. Berlin, 1868, p. 263, and Reise nach Mosambique, p. 20; Day, Fish. Malabar, p. 109; Kner, Novara Fische, p. 173.

Gobius kurpah, Sykes, Tr. Zool. Soc. ii, p. 352, pl. 61, f. 1.

Gobius kokius, Cuv. and Val. xii, p. 68; Jacq. Atl. t. xiv, f. 3; Jerdon, M. J. L. and Sc. 1848, p. 148; Bleeker, Verh. Bat. Gen. xxii, 24, 3; Cantor, Catal. p. 180.

Gobius catebus, Cuv. and Val. xii, p. 76; Jerdon, M. J. L. and Sc. 1851, p. 143.

Gobius kora, Cuv. and Val. xii, p. 77.

Gobius platycephalus, Peters. Monats. Akad. Berlin, 1852, p. 681, and Reise nach Mosambique, t. iii, f. 2.

Gobius spectabilis, Günther, Catal. iii, p. 45.

Wartee-poolah, *Pooan*, and *Kurdán*, Mal.; *Nullatan*, *Oolooway*, Tam.; *Tsikideondoa* and *Issakee doondoo*, Tel.; *Gulah*, Ooriah; *Nga-tha-boh*, Burmese; *Poo-dah*, Andam.; *Ab-bro-ny*, Canarese; *Goo-loo-wah*, and *Boul-la*, Punj.; *Gooloo*, Sind. and N. W. Prov.

B. iv, D. 6 | $\frac{1}{8-9}$, P. 20, V. 1/5, A. $\frac{1}{8-9}$, C. 17, L. l. 30-34, L. tr. 8-9, Vert. 11/16.

Length of head $3\frac{1}{2}$ to 4, of caudal 4 to $5\frac{1}{2}$, height of body 5 to $6\frac{1}{2}$ in the total length. *Eyes*—diameter 1/6 to 1/8 of length of head, 2 to $2\frac{1}{2}$ diameters from end of snout, and 1/3 to 3/4 of a diameter apart. Interorbital space slightly concave, with an open gland. Greatest width of head* equals from 1/2 to 3/5 of the length of the head, whilst its height equals about 1/2 its length. Lower jaw the longer, the maxilla extends to below the anterior edge of the orbit. *Teeth*—in villiform rows, with an outer enlarged row in the upper jaw, laterally in two rows of which the inner is sometimes the larger: in the lower jaw a large row anteriorly, laterally two rows. *Fins*—these are subject to very great variations as to the length of the spines and rays, as might be anticipated in a fish which is so extensively used for stocking ponds, and as far as I have seen the variety *G. giuris*, or *G. spectabilis*, is that in which they are most lengthened. I have a specimen from Calcutta in which the caudal fin is 1/4 of the total length, and another from Assam in which it is $4\frac{1}{2}$, as shown in Ham. Buch. In some the spines of the first dorsal are a little higher than the body, in others a little lower: the posterior rays of the second dorsal reach to the caudal, in others not above 1/2 way to that fin. Caudal somewhat pointed or rounded. *Scales*—extend superiorly to nearly as far as the hind edge of the eyes, and from 25 to 30 rows before the base of the dorsal fin, where they are smaller than those on the body which are angular and ctenoid. *Colours*—vary both with the localities and also with the colour of the water, they may generally be said to be of a fawn-colour, with cloudy markings on the head, and irregular bands, spots, or blotches, on the back and sides of the body. Vertical fins spotted.

This fish may be divided as follows:—

Gobius giuris, H. B.=*G. catebus*, C. V.=*G. spectabilis*, Günther. As a rule there is no distinct black blotch on the first dorsal spine, but both the dorsal fins have from six to eight or even more rows of spots: the caudal is closely banded in spots, as in *G. puntang*. This form is most common in the freshwaters of Bengal, Assam, and Burma, but it does not exclude either of the two next.

Gobius kora mottah, Russell=*G. kora*, C. V. In this form, the tail fin is entirely, or almost entirely destitute of spots, but instead has dark edges.

Gobius bullee kokah, Russell=*G. kurpah*, Sykes=*G. Russellii*, C. V.=*G. platycephalus*, Peters. There are usually only three or four rows of spots along the dorsal fins, and a deep black blotch on the first dorsal spine anteriorly, which extends on to the interspinous membrane. The caudal has distinct black bands, from four to six or eight, but is not so closely barred as in the Bengal variety.

Gobius koku, Russell=*G. kokius*, C. V. is an entirely marine form, and probably a distinct species. Its snout is narrower at its base where it only equals its length. The last rays of the dorsal fin are short. It has four or five large blotches along the sides, and intermediate above them usually three more. Its fins are spotted in about three or four rows, there is no black blotch on the first dorsal spine: its caudal is spotted in rows.

This fish is much esteemed by the natives of India as being very light and wholesome, but unless elaborately cooked is not relished by Europeans, because of its deficiency in or earthy taste. It is very voracious and takes a bait freely.

Habitat.—East coast of Africa, also in all pieces of fresh water throughout the plains of India, Ceylon, Burma, Sind, to the Malay Archipelago and beyond: attaining a foot and a half in length. The variety (? species) *kokius* never exceeds a span, and appears to be entirely confined to the sea and estuaries all along the coasts of India, and also at the Andamans.

31. Gobius semidoliatus, Plate LIX, fig. 6 ($\frac{2}{1}$).

Cuv. and Val. xii, p. 67; Günther, Catal. iii, p. 31; Klunz. Verh. z. b. Ges. Wien, 1871, p. 475.

B. v, D. 6 | $\frac{1}{9}$, P. 17, V. 1/5, A. 8, C. 13, L. l. 28, L. tr. 9.

Length of head $4\frac{1}{4}$, of caudal $4\frac{1}{4}$, height of body $4\frac{3}{4}$ in the total length. *Eyes*—diameter $3\frac{1}{4}$ in length of

* This is one of the freshwater species of Indian fishes in which but little reliance can be placed upon the "width of the head," because they frequently die with their mouths distended, as is so often seen in *Gudgeons* in Europe. All Museum specimens of GOBIIDÆ should be examined to see whether they have stiffened with their gills distended, as such alters the shape of the head.

head, 3/4 of a diameter from end of snout, and 1/2 a diameter apart. Dorsal profile more convex than that of the abdomen. Greatest width of head equals its length behind the middle of the eyes, whilst its height is slightly more. Lower jaw the longer, cleft of mouth oblique, commencing opposite the upper third of the eye, the maxilla reaches to below the middle of the orbit. Neither scales, rows of warts, or barbels on the head. *Teeth*—in villiform rows, the outer of which is enlarged, and the last of the outer row in the lower jaw is slightly recurved, but can scarcely be considered a canine.* *Fins*—dorsal spines flexible, having filamentous terminations, the fin is as high as the body, and 1/3 higher than the second. Pectoral as long as the head. Caudal rounded. *Scales*—strongly ctenoid. *Colours*—chestnut, with three rather wide transverse interorbital bands: between the eye and the dorsal fin are three more bands which cross the back, and four or five more descend from below the commencement of the second dorsal fin to 1/3 down the sides. Three bands descend from the eye, another over the opercle and one in front of the pectoral fin. Both dorsal fins with brown spots.

Habitat.—Red Sea to the Andamans. I obtained two small specimens of this species at the Andamans, the one figured is twice life-size.

32. Gobius magniloquus.

B. v, D. 6 | $\frac{1}{8}$, P. 17, V. 1/5, A. 9, C. 13, L. l. 38, L. tr. 10.

Length of head $4\frac{1}{4}$, of caudal $5\frac{1}{3}$, height of body $6\frac{1}{2}$ in the total length. *Eyes*—diameter $3\frac{2}{3}$ in length of head, 1/2 a diameter from end of snout, and 2/3 of a diameter apart. Greatest width of head equals half its length: its height equals its length behind the eyes. Snout slightly depressed. Cleft of mouth rather oblique, commencing opposite the lower edge of the eye, lower jaw the longer, the maxilla reaches to below the hind edge of the eye. *Teeth*—villiform, outer row enlarged, but without canines, two or three posterior canines in the middle line above the symphysis of the lower jaw. *Fins*—dorsal spines with filamentous terminations, and 2/3 as high as the body, an interspace of five scales between the bases of the two dorsal fins: last dorsal rays two-thirds the height of the body, and reach half way to the base of the caudal. Pectoral as long as the head behind the eyes. Caudal wedge-shaped. *Scales*—ctenoid, extending forwards to opposite the hind edge of the eyes, where there exists a large one (as in an *Ophiocephalus*) and 15 rows between it and the base of the first dorsal fin, which are scarcely smaller than those on the body. Opercles scaled. *Colours*—light brown, covered with fine black dots and spots on the scales. A dark band from the eye across the opercles. A dark spot on upper edge of base of pectoral. Dorsal and caudal spotted in rows.

Habitat.—Madras, to $1\frac{3}{4}$ inches in length.

33. Gobius planiceps.

B. v, D. 6 | $\frac{1}{8}$, P. 17, V. 1/5, A. 9, C. 13, L. l. 38, L. tr. 10.

Length of head $4\frac{1}{3}$, of caudal $4\frac{2}{3}$, height of body $4\frac{3}{4}$ in the total length. *Eyes*—diameter $3\frac{1}{2}$ in length of head, 3/4 of a diameter from end of snout, and $1\frac{1}{4}$ apart. Head broad and flattened superiorly, its greatest width equalling its length behind the middle of the eyes, its height rather less. Cleft of mouth oblique, commencing opposite the upper edge of the eye, the maxilla extends to below the middle of the eye. *Teeth*—villiform, with the outer row enlarged, no canines. *Fins*—dorsal spines 2/3 the height of the body, a distance equal to four scales between the bases of the two dorsal fins: last dorsal ray divided to its base, and nearly as high as the body. Caudal rounded. *Scales*—ctenoid, 19 rows before the first dorsal fin, they suddenly become larger below the second dorsal fin, where they are angular. *Colours*—dark brown, every scale on the body with a dark purplish band down its centre. A dark spot above the axilla. A black band across the base of the pectoral. Caudal with eight angular bars of spots.

Habitat.—Madras, up to $1\frac{1}{2}$ inches in length.

34. Gobius sadanundio, Plate LXIII, fig. 10.

Ham. Buch. Fish. Ganges, pp. 56, 366; Bleeker, Verh. Bat. Gen. xxv, Beng. en Hind. p. 102, t. 2, f. 2; Günther, Catal. iii, 29.

Oontoo-mossal, Mugh. (Akyab.)

B. v, D. 6 | $\frac{1}{8}$, P. 19, V. $\frac{1}{5}$, A. $\frac{1}{8}$, C. 15, L. l. 28-30, L. tr. 8.

Length of head $4\frac{1}{2}$, of pectoral 4, of caudal 5 to 6, height of body $4\frac{1}{2}$ to 5, of first dorsal up to 3, of second dorsal and anal each $5\frac{1}{2}$ to 6 in the total length. *Eyes*—diameter from 1/3 to 2/7 of the length of head, 1/4 to 1/2 a diameter from the end of the snout, and $1\frac{1}{4}$ apart. Greatest width of head equals its length excluding the snout, and its height is a little more. Mouth almost horizontal, cleft commencing opposite the lower edge of the eye: jaws of equal length. The maxilla reaches to below the middle or last third of the orbit. *Teeth*—villiform, without canines, outer row in premaxillaries enlarged. *Fins*—the second and third dorsal spines elongated, filamentous: four rows of scales between the two dorsal fins, the bases of which are 1 diameter of the orbit apart; about 10 rows anterior to the base of the first dorsal fin. Caudal rounded. *Scales*—ctenoid, eight rows between the origin of the second dorsal and anal fins: they exist on the opercles and are extended on the head to between the eyes, on the cheeks they are rudimentary. *Colours*—olive, with very large deep

* If this fish attains any size the probability is that a posterior lateral canine will be present in the lower jaw, judging from the dentition in specimens of other species of the same size and what exists when they become large.

black, white-edged blotches scattered over the body: first dorsal black, with a white ring on its last three rays: second dorsal with two rows of black spots along its base, and a third of white dots along its centre. Ventral black in the centre, and having orange edges. Anal dark olive, margined with black. Caudal with numerous fine black dots.

Habitat.—Mouths of the Ganges, and along the Chittagong and Burmese coasts, attaining at least 3 inches in length.

35. Gobius melanosoma, Plate LXIV, fig. 1, ($\frac{2}{1}$).

Bleeker, Ceram. ii, p. 703; Peters, Monats. Ak. Berlin, 1868, p. 265.
Gobius gobiodon, Day, Proc. Zool. Soc. 1869, p. 516.
Paragobiodon melanosoma, Bleeker, Gobioides, 1874, p. 21.

B. v, D. 6 | $\frac{1}{8}$, P. 21, V. 1/5, A. 10, C. 15, L. l. 22-25, L. tr. 8-9.

Length of head 3 to $3\frac{1}{3}$, of caudal 5, height of body $3\frac{1}{2}$ in the total length. *Eyes*—diameter $3\frac{3}{4}$ in length of head, 1/2 to 2/3 of a diameter from end of snout, and $1\frac{1}{2}$ diameters apart. Form of body elevated and compressed. Anterior, portion of head and jaws covered with warty tubercles and fine hairy barbels. Cleft of mouth very oblique, commencing opposite the middle of the eyes: the maxilla reaching to below the front margin of the eyes. Height of head equals its length without the snout. *Teeth*—villiform, with one or two posterior canines above the symphysis of the lower jaw. *Fins*—first dorsal somewhat higher than the second, but not quite half of that of the body, the last dorsal ray reaches rather above half-way to the base of the caudal. Pectoral as long as the head excluding the snout: ventral reaches half-way to the anal. Caudal rounded. *Scales*—ctenoid, extending forwards to opposite the middle of the first dorsal fin, eight or nine rows between the bases of second dorsal and anal. *Colours*—brownish, the head may be light-coloured: dorsal, anal, and caudal very dark, ventrals nearly black having a reddish edge, caudal reddish.

Habitat.—Andamans and Nicobars to the Malay Archipelago. It appears to be a small species, the one figured (from the Andamans) is twice the natural size.

36. Gobius nunus.

Ham. Buch. Fish. Ganges, pp. 54, 366; Cuv. and Val. xii, p. 138.

B. v, D. 5 | $\frac{1}{9}$, P. 17, V. 1/5, A. 9, C. 15, L. l. 30, L. tr. 7.

Length of head $4\frac{1}{3}$, of caudal 5, height of body 5 in the total length. *Eyes*—small, in the anterior part of the head, 1 diameter from end of snout. Greatest width of head equals its height and half its length. Cleft of mouth very oblique, lower jaw the longer, the maxilla reaches to below the hind edge of the eye. *Teeth*—external row in lower jaw enlarged, the outer tooth being rather recurved. *Fins*—first dorsal spines with filamentous prolongations: caudal wedge-shaped. *Scales*—ctenoid, extended to over head and cheeks, ten rows before the dorsal fin. *Colours*—reddish-brown with seven black belts, the first through the eye, the second over the opercles, and five more down the body, the last being at the root of the caudal fin, these bands are extended on to the vertical fins.

Habitat.—River Hooghly, also Burma; the one described is hardly an inch in length, and was captured by the late Dr. Stoliczka in a freshwater stream, near Moulmein.

Genus, 2—Gobiodon, *Bleeker.*

Gill-openings of moderate width. Body oblong and compressed: head large. Teeth conical and fixed: a pair of posterior canines generally present near the symphysis of the lower jaw. Two dorsal fins, the first with six spines and united at its base to the second; ventrals united. Scales absent.

SYNOPSIS OF SPECIES.

1. *Gobiodon quinque-strigatus*, D. 6 | $\frac{1}{10-11}$, A. $\frac{1}{8-9}$. Eyes 1 to $1\frac{1}{2}$ diameters from end of snout. Two small posterior canines above symphysis of lower jaw. Head with five vertical orange stripes: two or three similar bands or rows of blotches on the body. Andamans to the Malay Archipelago.
2. *Gobiodon erythrospilus*, D. 6 | $\frac{1}{10-11}$, A. $\frac{1}{9}$. Eyes less than 1 diameter from end of snout. Two small posterior canines above symphysis of lower jaw. Brown, with black fins. Ceylon, Andamans, Nicobars, to the Malay Archipelago.
3. *Gobiodon citrinus*, D. 6 | $\frac{1}{10}$, A. $\frac{1}{9}$. Eyes 3/4 of a diameter from end of snout. An inner enlarged row of teeth in the lower jaw, and a posterior lateral recurved canine. Four blue black-edged vertical streaks on the head and before the base of the pectoral fin: a similar band along the bases of dorsal and anal fins. Red Sea, Andamans, and Nicobars.

1. Gobiodon quinque-strigatus.

Gobius quinque-strigatus, Cuv. and Val. xii, p. 134; not Bleeker, Blenn. en Gob. p. 29, and Solor. p. 82.
Gobiodon quinque-strigatus, Bleeker, Gobioideorum, 1874, p. 17, not Boero, p. 408; Günther, Catal. iii, p. 87.
Gobius and *Gobion erythrophaios*, Bleeker, Gob. p. 29, and Boero, p. 409 (part.)
Gobius Ceramensis, Bleeker, Ceram. p. 704.

D. 6 | $\frac{1}{10-11}$, P. 19, V. 1/5, A. $\frac{1}{8-9}$, C. 15.

Length of head 1/4, of caudal 1/5, height of body 1/3 to 2/7 of the total length. *Eyes*—diameter 1/4 to

1/5 of length of head, 1 to $1\frac{1}{2}$ diameters from end of snout, and 1 apart. Body elevated and strongly compressed. Cleft of mouth commences opposite the lower edge of the orbit: the maxilla reaches to below the first third of the eye. Head as high as long, its anterior profile parabolic. No tubercles on forehead. *Teeth*—two large posterior canines above the symphysis of the lower jaw. *Fins*—first dorsal only half as high as the second, which latter equals the length of the head behind the middle of the eyes. Pectoral as long as the head. Ventrals reach 1/3 of the way to the anal. Caudal rounded. *Colours*—head with five vertical orange stripes: two irregular bands of the same colour pass along the body, breaking up into blotches, and a row of spots exists along the posterior third of the body, sometimes there is a black spot at the tip of the opercle. In my specimens, which have been only five or six years in spirit, the colours have almost entirely faded. Those described were observed in the recently captured fish.

Habitat.—Andamans and Nicobars, to $2\frac{1}{4}$ inches in length: is also found in the Malay Archipelago.

2. Gobiodon erythrospilus.

Gobius quinquestrigatus, Bleeker, Gob. p. 29, and Solor, p. 82 (not C. and V.)
Gobiodon Ceramensis, Günther, Catal. iii, p. 88 (not Bleeker).
Gobiodon erythrospilus, Bleeker, Gobioid. 1874, p. 22.

D. 6 | $\frac{1}{10-11}$, P. 19, V. 1/5, A. $\frac{1}{9}$, C. 15.

Length of head $4\frac{1}{4}$ to $4\frac{1}{2}$, of caudal 5, height of body 3 to $3\frac{1}{2}$ in the total length. *Eyes*—diameter $3\frac{1}{4}$ in length of head, less than 1 diameter from end of snout, and 1/2 to 2/3 of a diameter apart. Head compressed, as high as long. Cleft of mouth slightly oblique, the maxilla reaches to below the middle of the eyes. No tubercles on forehead. *Teeth*—two small posterior canines above the symphysis of the lower jaw. *Fins*—in some specimens the first dorsal spine is somewhat produced, otherwise the two dorsal fins are of about the same height or half of that of the body. Pectoral as long as the head. Ventral reaches 1/3 of the way to the anal. Caudal rounded. *Colours*—body brown, covered with small black spots, fins blackish. Caudal sometimes with a white base, or entirely white.

Habitat.—Ceylon, Andamans, Nicobars, to the Malay Archipelago.

3. Gobiodon citrinus, Plate LXIV, fig. 2.

Gobius citrinus, Rüpp. N. W. Fische, p. 139, t. xxxii, f. 4.
Gobius coryphænula, Blyth, P. A. S. of B., 1858, p. 272 (? Cuv. and Val. xii, p. 131.)
Gobiodon citrinus, Günther, Catal. iii, p. 87; Klunz. Verh. z. b. Ges. Wien, 1871, p. 49.
Pseudogobiodon citrinus, Bleeker, Gobioides, 1874, p. 21.

D. 6 | $\frac{1}{10}$, P. 20, V. 1/5, A. $\frac{1}{8-9}$, C. 13.

Length of head 4, of caudal $4\frac{1}{2}$, height of body 3 to $3\frac{1}{2}$ in the total length. *Eyes*—diameter $3\frac{1}{3}$ in length of head, 3/4 of a diameter from end of snout, and also apart. Cleft of mouth slightly oblique, commencing anteriorly opposite the lower edge of the eye. *Teeth*—in a single row in the upper jaw: a posterior enlarged row in the lower jaw, the external of which is a lateral recurved canine. *Fins*—dorsals of about the same height, and equalling the length of the head excluding the snout, the last rays of the second dorsal and anal almost reach the base of the caudal. Pectoral as long as the head. Ventral reaches half way to the anal. Caudal rounded. *Colours*—yellow, a blue black-edged horizontal streak goes along the bases of the dorsal and anal fins, in some specimens higher than in others: there are four similar vertical bands, two descending from the eye, one from the summit of the head to the opercles, and a fourth in front of the pectoral fins. A black spot at the posterior extremity of the opercle.

Habitat.—Red Sea, Andamans, and Nicobars. The specimen figured (life-size) is from the Andamans.

Genus, 2—SICYDIUM,* *Cuv. and Val.*

Sicyopterus, Gill; *Cotylopus*, Guich.; *Sicydiops* and *Microsicydium*, Bleeker.

Branchiostegals four: pseudobranchiæ, a slit behind the fourth gill: gill-openings of moderate width.

* Bleeker in his revision of the Gobioides, 1874, has:—

SICYDIINI. Moveable teeth in the gums and lips.

a. Two rows of teeth in each jaw.

1. *Tridentiger*, Gill. Inner row of teeth elongated, curved, the outer having their apices dilated and tricuspidate.

b. Teeth in the premaxillaries in a crowded row: two rows in the lower jaw, the outer of which is fine and moveable.

2. *Sicydium*, Val. Teeth in premaxillaries pointed and curved: in the lower jaw the inner row is conical and very unequal. Barbels on the lower jaw.
3. *Sicyopterus*, Gill. Inner row of teeth in lower jaw pointed, curved, and wide apart. No barbels on lower jaw.
   - α. *Sicyopterus*, Gill. Teeth in premaxillaries pointed, their apices neither compressed, swollen, nor incised.
   - β. *Cotylopus*, Guich. Teeth in premaxillaries having their apices compressed, dilated, and bilobed.
   - γ. *Sicydiops*, Bleeker. Teeth in premaxillaries with their apices compressed and dilated.
4. *Microsicydium*, Bleeker. Teeth in premaxillaries with their apices compressed and obtuse: inner row of teeth in the lower jaw small and of equal size. No scales on head or anterior portion of body.

c. Teeth in a single row in either jaw. Scaleless.

5. *Lentipes*, Günther=*Sicyogaster*, Gill. Front teeth in premaxillaries tricuspidate, lateral ones simple: all simple in the lower jaw.

Body sub-cylindrical. Eyes of moderate size. Upper jaw rather prominent, cleft of mouth nearly horizontal. Teeth in the upper jaw small, in one row, mostly implanted in the gums, and as a rule moveable, their apices may be compressed and dilated or bilobed: in the lower jaw they are in one or two rows, if two the outer is fine and moveable. Two dorsal fins, the first with six flexible spines: the caudal not united to the dorsal or the anal: ventrals united, forming a disk, which is more or less adherent to the abdomen. Scales ctenoid, of varying size. Air-vessel absent.

Geographical distribution.—This genus has a wide range in fresh and brackish waters, having been captured in the Mauritius, Bourbon, Burma, to the Malay Archipelago and beyond; also in the West Indies.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Sicydium fasciatum*, D. 6 | $\frac{1}{10}$, A. 11, L. l. 67, L. tr. 19. Brown, banded, spotted, and with dark fins. Burma.

1. Sicydium fasciatum, Plate LXIV, fig. 7.

B. iv, D. 6 | $\frac{1}{10}$, P. 17, V. 6, A. 11, C. 13, L. l. 67, L. tr. 19.

Length of head $5\frac{1}{4}$, of caudal $5\frac{1}{2}$, height of body $5\frac{1}{2}$ in the total length. *Eyes*—diameter 2/9 of length of head, nearly $1\frac{1}{2}$ diameters from end of the snout, and $1\frac{3}{4}$ apart. Body subcylindrical: head rather flattened superiorly, and broader than high, its breadth being equal to its length without the snout. Cleft of mouth horizontal, extending to below the centre of the orbit: lips rather thick: snout overhanging the mouth. No barbels. *Teeth*—in the upper jaw small, and implanted in the gums in a single row: the inner row in the lower jaw large, conical, recurved, some distance apart, there being two canines near the symphysis, also a minute row of sharp ones on the lower lip. *Fins*—dorsal spines rather filiform, and projecting beyond the membrane, being 3/4 as high as the body beneath, and 1/3 higher than the second dorsal. Pectorals nearly as long as the head: ventrals short, forming a complete disk, and not reaching half-way to the anal fin, which latter is beneath the soft dorsal but lower than it. Caudal rounded. *Scales*—strongly ctenoid, somewhat irregularly arranged, they extend forwards nearly as far as the eyes: those anterior to the dorsal fin (about 30 rows) and also in front of the anal, smaller than the others, and more or less cycloid. None on opercles or cheeks. *Colours*—reddish-brown, with about six vertical darker bands on the body wider than the ground colour: there are also some dark spots: its under surface is dirty yellowish-brown. Fins nearly black, with a light, nearly white, edge.

This *Sicydium* or *Sicyopterus*, Gill, is the most westerly species I am aware of on the continent of Asia.

Habitat.—Burma, to $2\frac{1}{4}$ inches in length, the specimen figured is life-size.

Genus, 3—APOCRYPTES,* *Cuv. and Val.*

Branchiostegals four: pseudobranchiæ rudimentary: gill-openings of moderate width. Body elongated. Teeth conical in a single fixed row in either jaw, with usually a pair of canines in the lower, and above the symphysis posterior to the fixed row: sometimes canines in the upper jaw. The first portion of the dorsal fin containing five or six flexible spines, and either distinct from or continuous with the soft portion, which is similar to the anal. Ventrals united, forming a disk, and only attached by their bases. Scales, when present, small, becoming larger posteriorly.

Geographical distribution.—Coasts of India, Burma, Andamans, and through the Malay Archipelago. They ascend estuaries and rivers, sometimes even above tidal influence.

SYNOPSIS OF SPECIES.

1. *Apocryptes serperaster*, D. 6 | 27, A. 27, L. l. 65-70, L. tr. 20. Whitish, with gray vertical bands. Seas of India and China.
2. *Apocryptes rictuosus*, D. 6 | 24-27, A. 25-29, L. l. ca. 75. Gray, with ill-defined oblique bands passing down from the back: usually a black, yellow-edged ocellus on last dorsal rays. Seas and estuaries of India.
3. *Apocryptes Bleekeri*, D. 6 | 22-25, A. 22-23, L. l. 50-55, L. tr. 13. Gray, with brown spots or blotches along the sides. Pectorals dark, with a light edge. Seas of India to the Malay Archipelago.
4. *Apocryptes batoides*, D. 6 | 23, A. 23. Teeth pointed. Head 1/2 as wide as long. Grayish. Moulmein.
5. *Apocryptes lanceolatus*, D. 5 | 31-32, A. 29-30. Greenish superiorly, with numerous brown spots and bands, dorsal and caudal spotted and barred. Seas of India to the Malay Archipelago.
6. *Apocryptes dentatus*, D. 5 | 32, A. 31. Said to have larger teeth than *A. lanceolatus*. Coromandel coast.

* Bleeker's APOCRYPTINI consists of Gobies possessing a single row of teeth in either jaw, those in the mandibles being sub-horizontal, with two erect posterior canines above the symphysis.

I. APOCRYPTEI—
1. *Apocryptodon*, Bleeker. Teeth in premaxillaries partly truncated, partly sharp canines: in the lower jaw truncated or bilobed.
2. *Parapocryptes*, Bleeker. Teeth subulate and sharp in both jaws, partly canines in premaxillaries.
3. *Apocryptes*, Val.=*Gobileptes*, Swains. Teeth in both jaws, with their apices incised: no canines in the premaxillaries.
4. *Pseudapocryptes*, Bleeker. Teeth in both jaws with their apices obtuse, swollen, not incised: no canines in the premaxillaries.

7. *Apocryptes bato*, D. 5 | 21-22, A. 23. Teeth notched. Head 2/3 as wide as long. Light greenish, with ill-defined vertical bands. Orissa and lower Bengal, within tidal reach.

1. Apocryptes serperaster, Plate LXVI, fig. 2.

Richardson, Ich. China, p. 206; Günther, Catal. iii, p. 82.

B. iv, D. 6 | 27, P. 21, V. 1/5, A. 27, C. 13, L. l. 65-70, L. tr. 20.

Length of head $6\frac{1}{2}$, of caudal 5, height of body 7 in the total length. *Eyes*—diameter $4\frac{1}{2}$ to 5 in length of head, 1 to $1\frac{1}{4}$ diameters from end of snout, and 1/4 of a diameter apart. Snout obtuse, convex. Lower jaw slightly the longer. Cleft of mouth oblique, the maxilla reaching to below the hind edge of the eye. Greatest width of head equals its height, and its height its length behind the eye. *Teeth*—villiform in the upper jaw, with an outer enlarged row directed downwards of from four to eight on either side of the symphysis of the upper jaw: in a single row in the lower jaw of teeth directed outwards, and a single or a pair of large canines internally above the symphysis. *Fins*—dorsal fins not continuous, the first twice as high as the second, its spines weak and having filamentous terminations, the last dorsal ray reaches to beyond the commencement of the caudal fin. Pectoral as long as the head excluding the snout. Ventrals not having a posterior attachment to the abdomen and reaching as far as the pectorals extend. Anal commences under the vertical from the second ray of the dorsal, which fin it resembles, but is slightly lower. Caudal lanceolate. *Scales*—over body and head, excluding the interorbital space, snout, and jaws, the smallest are between the occiput and fourth dorsal spine, and anteriorly to a line drawn from thence to the base of the anal fin, posterior to this they are in regular rows: they are much larger in the hinder portion of the body, there being only six rows between the last dorsal ray and base of anal fin. *Colours*—of a dull greenish along the upper surface of the head and back, becoming dull white on the sides and abdomen: five or six irregular bands pass from the back to half-way down the sides. A narrow gray band along the lower third of both dorsals, which are also dark externally. Caudal gray, with a light yellowish outer edge. Pectoral gray, with its upper and five lower rays yellowish white. Anal with a narrow gray band along its centre, its outer edge dark, and its last rays nearly black.

Habitat.—Seas and estuaries of India and China. The specimen figured (life-size) is from Madras, where it is not rare up to five or six inches in length.

2. Apocryptes rictuosus.

Cuv. and Val. xii, p. 151; Jerdon, M. J. L. and Sc. 1851, p. 143; Günther, Catal. iii, p. 82; Day, Fish. Malabar, p. 113.

B. iv, D. 6 | 24-27, P. 20, V. 1/5, A. 25-29, C. 13, L. l. ca. 75.

Length of head $7\frac{1}{2}$, of caudal 3, height of body 11 to 13 in the total length. *Eyes*—diameter 1/6 to 1/7 of length of head, about 1 diameter from end of snout, and 1/3 of a diameter apart. Greatest width of head equals half its length and its height equals its length behind the eyes. Snout rather obtuse, lower jaw a little the longer, cleft of mouth deep, extending at least 1 diameter of the eye beyond the hind edge of orbit. *Teeth*—from 20 to 28 pointed ones in either ramus of the lower jaw, the most external of which is recurved: a rather large number also of pointed ones in the upper jaw: a pair of small canines, internally, above the symphysis of the lower jaw. *Fins*—dorsals continuous at their bases, spines of first dorsal with filamentous prolongations, but not much higher than the second dorsal: last dorsal ray extends to as far as the base of the caudal. Pectoral as long as the head excluding the snout, and of equal length with the ventral. Anal commences on the vertical below the second or third dorsal ray. Caudal pointed and very elongate. *Scales*—in irregular rows, very small anterior to the dorsal fin, becoming larger posteriorly. *Colours*—grayish, lighter towards the abdomen, with badly defined oblique bands passing downwards and forwards from the base of the dorsal fin half way to the abdomen. Ventral whitish. Pectoral, anal, first and second dorsal whitish, externally stained with gray, sometimes spotted with brown: usually a black spot surrounded by a yellow ring on the last few dorsal rays. The inside of the mouth with black spots.

Habitat.—Seas and estuaries of India, attaining 7 inches in length.

3. Apocryptes Bleekeri, Plate LXIV, fig. 3.

Apocryptes Madurensis, Day, Proc. Zool. Soc. 1873, p. 109 (not Bleeker, Blenn. en Gob. p. 35; Günther, Catal. iii, p. 84).

B. iv, D. 6 | 22-25, P. 19, V. 1/5, A. 22-23, C. 13, L. l. 55-60, L. tr. 13.

Length of head $4\frac{1}{2}$ to 5, of caudal 5 to $5\frac{1}{2}$, height of body 7 to 8 in the total length. *Eyes*—diameter 1/5 to 1/6 of length of head, 1 to $1\frac{1}{2}$ diameters from end of snout, and 1/2 a diameter apart: interorbital space concave. Greatest width of head equals half its length, and its height equals its length behind the eyes. Snout somewhat compressed, jaws of about equal length, cleft of mouth nearly horizontal: the maxilla reaches to about the length of one or two diameters of the orbit behind the posterior edge of the eye: extent of the gape 1/4 less than that of the cleft. *Teeth*—25 to 30 teeth notched at their extremities in the anterior half of the lower jaw on either side: 15 or 20 pointed ones on either side of the premaxillaries extending further backwards than in the mandibles, whilst they are not placed so closely together. *Fins*—first dorsal higher than the second, and equal from 2/3 to the height of the body, the membrane of the first dorsal extends to the commencement of the

second, which latter fin is higher than the anal. Pectoral as long as the head without the snout: ventral reaches nearly half way to the anal. Caudal pointed. *Scales*—cycloid and arranged in regular rows, largest in the posterior portion of the body, they are extended on to the head and cheeks, 13 rows between the origin of the second dorsal and anal fins. *Colours*—grayish or olive brown, with five light brown spots along the sides, usually forming bands over the back: numerous fine dots over the head and body. Pectoral deep olive or nearly black, with a white lower edge. First dorsal mostly with a dark mark in its upper fourth between its third and fifth spines. Second dorsal and caudal with some rows of fine dots. Ventrals white.

From the description it appeared to me that this species might be identical with *A. glyphidodon*, Bleeker, but Dr. Bleeker observes that the figure has a physiognomy very different from *Apocryptodon glyphidodon*, Bleeker. I therefore propose naming it after that learned ichthyologist.

Variety.—Without scales on the head, an ocellus at end of soft dorsal fin, and last third of anal with a gray band along its base.

Habitat.—Seas of India to the Malay Archipelago, attaining at least 4 inches in length. The one figured (life-size) is from Madras.

4. Apocryptes batoides, Plate LXVI, fig. 3.

B. iv, D. 6 | 23, P. 21, V. 1/5, A. 23, C. 13.

Length of head $6\frac{1}{3}$, of caudal $3\frac{2}{3}$, height of body 12 in the total length. *Eyes*—high up, diameter $6\frac{1}{2}$ in length of head, 2 diameters from end of snout, and 3/4 of a diameter apart. Greatest width of head equals its height or 1/2 its length. Cleft of mouth nearly horizontal: upper jaw slightly the longer: width of the gape exceeds that of the cleft: the maxilla reaches to below the front edge of the eye. *Teeth*—eight to ten pointed ones on either side of both jaws, none are notched, whilst all are of a brown colour, two moderately sized posterior canines in the lower jaw. *Fins*—the two dorsals of about the same height, and equal to that of the body. Pectoral half as long as the head: ventral reaches half way to the anal. Caudal lanceolate. *Scales*—cycloid, large and small ones intermixed, becoming largest posteriorly, they are extended on to the head. *Colours*—grayish along the back, becoming whitish below: fins without marks.

This species reminds one of *A. bato*, which however has notched teeth, whereas *A. batoides* has sharp ones, or *Parapocryptes*, Bleeker.

Habitat.—Moulmein, where the example, 10 inches long, was obtained.

5. Apocryptes lanceolatus, Plate LXIV, fig. 5.

Eleotris lanceolata, Bl. Schn. p. 67, t. 15.

Gobius changua, Ham. Buch. Fish. Ganges, pp. 41, 365, pl. 5, f. 10.

Apocryptes changua, Cuv. and Val. xii, p. 145; Bleeker, Blenn. en Gob. pp. 5, 36.

Scartelaos calliurus, Swains. Fishes, ii, p. 280.

Apocryptes lanceolatus, Cantor, Catal. p. 187; Jerdon, M. J. L. and Sc. 1851, p. 143; Günther, Catal. iii, p. 80; Kner, Novara Fische, p. 180.

Pseudapocryptes lanceolatus, Bleeker, Gobioides, 1874, p. 40.

Nullah ramah, Tel.

B. iv, D. 5 | 31-32, P. 21, V. 1/5, A. 29-30, C. 11.

Length of head 7 to $7\frac{1}{2}$, of caudal $4\frac{1}{2}$ to $6\frac{1}{2}$, height of body 7 to 9 in the total length. *Eyes*—diameter 1/6 to 1/7 of length of head, $1\frac{1}{4}$ diameters from the end of snout, and 1 apart. Greatest width of head equals half or more than half of its length, and its height 3/5 of its length. Jaws of nearly equal length anteriorly, the maxilla reaches to beneath the middle or hind edge of the orbit. *Teeth*—of moderate size in the upper jaw, with blunt free extremities as if cut off, or else slightly swollen; those in the lower jaw horizontal, occasionally the outer one is slightly recurved and a little enlarged: a pair of posterior canines above the symphysis. *Fins*—the membrane of the first dorsal fin scarcely reaches to the base of the second dorsal, the two fins of about the same height and equal to half that of the body. Pectoral two-thirds as long as the head: ventral reaches about 1/3 of the way to the anal. Caudal lanceolate. *Scales*—minute, becoming most distinct in the posterior portion of the body. *Colours*—dull greenish superiorly, with numerous fine brown spots and usually many dark bands descend from the back towards the abdomen: dorsals with several rows of fine spots: caudal barred in a few or many rows as observed in *Gobius giuris*, and this seems the form figured amongst Sir W. Elliot's drawings of Fishes of India named by Jerdon *Apocryptes dentatus?*

Habitat.—Seas of India to the Malay Archipelago; attaining at least 8 inches in length. The specimen figured (life-size) is from Calcutta.

6. Apocryptes dentatus.

Cuv. and Val. xii, p. 148; Jerdon, M. J. L. and Sc. 1851, p. 143; Günther, Catal. iii, p. 81.

B. iv, D. 5/32, A. 31, Vert. 12/15.

Length of head 1/8, of caudal 2/9, height of body 1/14 of the total length. *Eyes*—diameter 1/6 of length of head, rather more than 1 diameter from end of snout, and 1/2 a diameter apart. Snout rounded: jaws of equal length anteriorly, the cleft of the mouth horizontal and extending to behind the posterior margin of the orbit. *Teeth*—20 in each jaw, the central ten the largest, a pair of canines near the symphysis. *Fins*—

dorsal low, the first connected by its membrane to the base of the second. Caudal lanceolate. *Scales*—very small. *Colours*—olive or brownish, palest below: caudal reddish dotted with brown.

This fish appears from the description (as yet I have not seen the type) to be identical with *A. lanceolatus*. It is said to be remarkable by the largeness of its teeth and the smallness of its eyes; this last character bringing it nearly to the genus *Amblyopus*. However its eyes are stated as 1/6 of the length of the head, and *A. lanceolatus* is said to have them of exactly the same size. As regards the size of its teeth these vary exceedingly in different specimens.

Habitat.—Coromandel coast of India.

7. Apocryptes bato, Plate LXIV, fig. 6.

Gobius bato, Ham. Buch. Fish. Ganges, pp. 40, 365, pl. 37, f. 10.

Apocryptes bato, Cuv. and Val. xii, p. 143, pl. 369; Bleeker, Beng. en Hind. p. 103, and Gobioides, 1874, p. 39; Günther, Catal. iii, p. 82.

Rutta, Ooriah.

B. iv, D. 5 | 21-22, P. 23, V. 1/5, A. 23, C. 13.

Length of head 6 to $6\frac{1}{2}$, of caudal $4\frac{2}{3}$, height of body 7 in the total length. *Eyes*—rather high up, diameter $5\frac{1}{2}$ to 6 in the length of head, 1 to $1\frac{1}{2}$ diameters from end of snout, and 1 apart. Interorbital space slightly concave. Greatest width of head equals its height or 2/3 of its length: snout rounded. Upper jaw slightly the longer: cleft of mouth nearly horizontal; the gape slightly exceeds the extent of the cleft: the maxilla reaches to below the first third or centre of the eye. *Teeth*—about 24 on either side of both jaws, all of which are notched at their extremities, those in the mandible horizontal: two moderately sized posterior canines in the lower jaw. *Fins*—dorsal and anal fins of about the same height, and equal to 2/3 of that of the body. Pectoral half as long as the head, ventral reaches half way to the anal. Caudal lanceolate, most expanded in examples from Orissa. *Scales*—cycloid, large and small ones intermixed, becoming largest posteriorly, and extended on to the head. *Colours*—greenish-white, with about twelve ill-defined narrow bands, descending from the back towards the abdomen: scales with brown points: fins white, but also with minute dots: a dark band at the base of the pectoral.

Habitat.—Orissa and Lower Bengal within tidal reach, attaining $6\frac{1}{2}$ inches length. The specimen figured (life-size) is from Calcutta.

Genus, 4—Apocryptichthys.

Branchiostegals five. Gill-openings rather small. Body elongated. Teeth in a single fixed row in either jaw, those in the premaxillaries curved, pointed, elongated, and with a long canine on either side of the symphysis: those in the lower jaw sub-horizontal, rather swollen at their free extremities, and no posterior canines. Two separate dorsal fins, the first with six flexible spines, the second elongated and similar to the anal. Ventrals united, forming a disk and only connected to the body by their bases. Caudal lanceolate. Scales cycloid, absent from the head, becoming largest posteriorly.

The fish for which this Genus is proposed is rather peculiar in possessing or being deficient in characters appertaining to the *Apocryptina* and *Amblyopina*.

It can hardly be an *Apocryptes* as it has no posterior canines above the symphysis of the lower jaw, whilst the teeth in its premaxillaries are very elongate: its eyes are not prominent, and are larger than in the *Amblyopina*; its dorsal fins likewise are distinct.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Apocryptichthys Cantoris*, D. 6 | 27, A. 26, L. l. ca. 90, L. tr. 17. Grayish-olive with dark fins. Andamans and Madras.

1. Apocryptichthys Cantoris, Plate LXII, fig. 7.

Apocryptes Cantoris, Day, Proc. Zool. Soc. 1870, p. 693.

B. v, D. 6 | 27, P. 19, V. 1/5, A. 26, C. 17, L. l. ca. 90, L. tr. 17.

Length of head 1/4, of caudal 1/5, height of body 1/9 of the total length. *Eyes*—not prominent, diameter 1/6 of length of head, 1 diameter from end of snout, and 2/3 of a diameter apart. Head rather depressed, its lower surface flat: greatest width equals its height or 2/5 of its length. Cleft of mouth slightly oblique, commencing anteriorly opposite the lower edge of the eye, the maxilla reaches to 1 diameter of the orbit behind its posterior edge. An angular pendulous flap of skin from the preorbital falls to over the teeth on the side of the upper jaw. No barbels. *Teeth*—fixed, curved, and elongated, about 13 on either side of both jaws, the two central ones in the premaxillaries being long pointed canines curving downwards extending far beyond the lips; those in the lower jaw sub-horizontal and curved slightly upwards, whilst their extremities are rather enlarged, no posterior canines. *Fins*—first and second dorsals of about the same height: the membrane of the first dorsal continued almost to the base of the second. Base of the pectoral not muscular, the fin as long as the head behind the eyes: ventrals with a well developed basal membrane, not adherent to abdomen. Caudal lanceolate. *Scales*—cycloid, about 90 rows along the body much smallest anteriorly; 17 rows between bases of second dorsal and anal. None on the head. Gill-opening rather small, before the lower half of the

base of the pectoral fin. *Colours*—grayish-olive: first dorsal dark, longitudinally banded: caudal dark with some spots in its upper half.

Habitat.—Madras and Andamans. The specimen figured (life-size) is from the latter locality.

Genus, 5—Periophthalmus,* *Bl. Schn.*

Mud-skippers.

Branchiostegals five: pseudobranchiæ rudimentary. Gill-openings rather narrow. Body elongated, subcylindrical anteriorly. Profile from eyes to snout very steep. Eyes placed close together, very prominent, and the eyelids well developed. Teeth in both jaws, erect, conical, fixed, and in one or two rows. Two dorsal fins, the first with a varying number of flexible spines: base of pectoral muscular: ventrals more or less united in their lower two-thirds: caudal with its inferior edge obliquely truncated. Air-vessel absent. Scales small or of moderate size, cycloid or feebly ctenoid, covering the body and the base of the pectoral fins.

These fishes, due to the muscular development at the base of the pectoral fins, are able to use them for progression as mud-skippers or climbers. I made the following remarks on the *P. Schlosseri* in the Irrawaddi river:—It is most curious to see these little fishes along the side of the Burmese rivers, at a distance they at first appear between large tadpoles, stationary, contemplating all passing objects, or else snapping at flies or insects: suddenly startled by something, away they go with a hop, skip, and a jump, either inland among the trees, or on to the water like a flat stone or a piece of slate sent skimming by a schoolboy. They climb on to trees and large pieces of grass, leaves and sticks, holding on by their pectoral fins exactly as if they were arms. Now and then they plant these firmly as an organ of support, the same as one places one's elbows on a table, then they raise their heads and take a deliberate survey of surrounding objects.

They are not very timid, in fact my interpreter captured several by means of quietly creeping up to them and knocking them over with a stick. Occasionally, when moored, they crawled up to the boat's rope, and even on to its sides. Some looked light brown with dark bands, others darker, whilst a few were of a brilliant emerald green, probably due to the position of the body and the reflection of the light. One morning when at anchor I saw close to the side of my boat a snake in the water watching one of these fish, which was intently occupied capturing flies: with a stick I saved it from its reptilian foe, but its colours were so vivid I could not resist giving it a place in one of my collecting bottles. They are extensively used in Burma for live bait, a purpose for which they appear to be well adapted.

SYNOPSIS OF SPECIES.

1. *Periophthalmus Koelreuteri*, D. 10-15 | 12-13, A. 10-14, L. l. 75. First dorsal fin variously formed, being produced or not so. Second dorsal generally banded, and first dorsal mostly with a black intramarginal edge. Seas and estuaries of India to the Malay Archipelago and beyond.

2. *Periophthalmus Schlosseri*, D. 0-15 | $\frac{1}{12}$, A. $\frac{1}{12}$, L. l. 55, L. tr. 11-12. Banded, with emerald green spots: dorsal blackish, having a scarlet band, edged with blue and tipped with white. Coasts and large rivers of India, Burma, Andamans, to the Malay Archipelago and beyond.

1. Periophthalmus Koelreuteri, Plate LXIV, fig. 8.

Gobius Koelreuteri, Pall. Spic. viii, p. 8, t. ii, f. 1.

Periophthalmus Koelreuteri, Bl. Schn. p. 65; Cuv. and Val. xii, p. 181; Rüpp. N. W. Fische, p. 140; Bleeker, Blenn. en Gob. p. 252; Günther, Catal. iii, p. 97; Kner, Novara Fische, p. 182; Steind. Ak. Wien, 1869, p. 945; Klunz. Verh. z. b. Ges. Wien, 1871, p. 485.

Periophthalmus papilio, Bl. Schn. p. 63, t. xiv; Cuv. and Val. xii, p. 190, plate 353; Bleeker, Gobioides, 1874, p. 38.

Periophthalmus argentilineatus, Cuv. and Val. xii, p. 191; Bleeker, Amb. and Ceram. p. 276.

Periophthalmus kalolo, Less. Voy. Coq. Zool. ii, p. 146.

Periophthalmus modestus, Cantor, Ann. and Mag. 1842, ix, p. 29; Richards. Ich. China, pp. 208, 309; Temm. and Schleg. Fauna Japon. p. 147, pl. 76, f. 2; Bleeker, Japan, vi, p. 82.

Periophthalmus dipus, Bleeker, Bant. p. 320.

Periophthalmus fuscatus, Blyth, Journ. Asi. Soc. of Beng. 1859, p. 271, and 1860, p. 111.

Euchoristopus Koelreuteri, Bleeker, Gobioides, 1874, p. 38.

Chood-mud-dah, Andam.

B. v, D. 10-15 | 12-13, P. 15, V. 1/5, A. 11-14, C. 11, L. l. 75.

Length of head 4 to $4\frac{2}{3}$, of caudal $4\frac{3}{4}$, height of body 7 in the total length. *Eyes*—elevated, and close together, diameter 1/4 of length of head, and 1 diameter from end of snout. Greatest width of head equals its

* The Periophthalmini, Bleeker.

1. *Periophthalmus*, Bl. Sch. Teeth in a single row in both jaws, partly canines: in many rows of mainly fine, sharp ones in the pharyngeals.
2. *Euchoristopus*, Gill. Teeth in a single row in both jaws. No canines: in few rows of mostly conical ones in the pharyngeals.
3. *Periophthalmodon*, Bleeker. Anterior teeth in premaxillaries in two rows, the outer canines: in a single row in the lower jaw, a portion of which are canines.

height, and $1\frac{3}{4}$ in its length. Profile from eyes to end of snout very abrupt, cleft of mouth nearly horizontal, the maxilla reaching to below the middle of the eye. Skin of the snout forms fleshy flaps. *Teeth*—about 24 conical, pointed ones in each jaw. In some specimens they laterally decrease in size by degrees, as in one from the Andamans of the same length as the specimen figured, which latter, however, has the teeth of unequal sizes and distinct curved canines present in both jaws. In a smaller specimen from the latter locality only one canine has appeared, this seems due to an opposite tooth in the lower jaw having become lost. When teeth are regular, canines are absent, and the greater development of a tooth seems due to the loss of an opposite one. *Fins*—the first dorsal fin is much more elevated in some specimens than in others, being shortest in the immature. Ventrals short, connected with one another in their basal two-thirds. *Colours*—head sometimes with blue spots. Body olive brown, with white or blue dots: first dorsal bluish with a dark edge, having a white tip and occasionally white spots at its base: second dorsal generally with a black-white-edged longitudinal band in its upper half or upper third, whilst its lowest portion has white dots. Pectoral and caudal often with brown dots.

Steindachner, *l. c.* observes that *Periophthalmus Gabonicus* and *P. erythronemus* of Duméril and Guichenot are identical with *P. Koelreuteri.*

Bleeker considers *P. papilio* as the type of Genus *Periophthalmus* (as restricted) possessing canines and many fine rows of sharp teeth in the pharyngeals, and *P. Koelreuteri* as the type of *Euchoristopus*, having no canines, and a few rows of mostly conical ones in the pharyngeals. Günther observes "the size of the teeth varies considerably in this species, not only according to age, but in specimens of the same size, and from the same locality, and even on both sides of the same individual." (Catal. iii, p. 99.)

Habitat.—Seas and coasts of India, ascending estuaries and tidal rivers, also found at the Andamans, to the Malay Archipelago and beyond. The specimen figured (life-size) is from Sind, and has five enlarged, curved, canines in the lower, and four in the upper jaw much larger than the remainder of the teeth.

Periophthalmus Schlosseri, Plate LXVI, fig. 4.

Gobius Schlosseri, Pall. Spic. viii, p. 3, pl. 1, f. 1-4; Gmel. Linn. i, p. 1201; Lacép. ii, p. 573; Shaw, Zool. iv, p. 246.

Periophthalmus Schlosseri, Bl. Schn. p. 64; Cuv. and Val. xii, p. 192; Swainson, Fishes, ii, p. 280; Bleeker, Blenn. en Gob. p. 39; Cantor, Catal. p. 191; Cuv. Règ. Anim. Ill. Poisson. pl. 81, f. 1; Günther, Catal. iii, p. 100.

Gobius tredecem-radiatus, septem-radiatus, et *novem-radiatus*, Ham. Buch. Fish. Ganges, pp. 46, 47, 48, 366, pl. ii, f. 14.

Periophthalmus tredecem-radiatus, septem-radiatus, et *novem-radiatus*, Cuv. and Val. xii, pp. 189, 196; Swainson, Fishes, ii, p. 280.

Periophthalmus Freycineti, Cuv. and Val. xii, p. 197. Quoy and Gaim. Voy. Freyc. Poiss. p. 257; Swainson, Fishes, ii, p. 280.

? Periophthalmus Borneensis, Bleeker, Born. i, p. 11.

Periophthalmodon Schlosseri, Bleeker, Gobioides, 1874, p. 39.

B. v, D. 0-15 | $\frac{1}{12}$, P. 9, V. 1/5, A. $\frac{1}{12}$, C. 12, L. l. 55, L. tr. 11-12.

Length of head 4 to $4\frac{1}{4}$, of caudal 5 to 6, height of body 5 to 6 in the total length. *Eyes*—high up, diameter $4\frac{1}{4}$ to $4\frac{1}{2}$ in length of head, $1\frac{1}{4}$ diameters from end of snout, and 1/4 of a diameter apart. Greatest width of head equals $1\frac{3}{4}$ in its length and rather exceeds its height. Cleft of mouth nearly horizontal, the maxilla reaches to below the middle of the eye. *Teeth*—in both jaws, pointed, erect, the front six in the premaxillaries the longest. *Fins*—the first dorsal fin may be entirely absent, composed of very short spines, or of moderate development, or the anterior spine elongated as in the males. Pectorals with a strong muscular base. Ventrals united in their basal third or entirely separated. Lower edge of caudal obliquely truncated. *Colours*—when alive, brownish banded, with emerald green spots most distinct on the head, but in certain lights all over the body. First dorsal black, which becomes bluish superiorly, and edged with white, it has a scarlet band along its centre with a white dot between each ray. Second dorsal the same, but the base lighter and spotted: anal edged with white. In the *male* the first dorsal fin has a black band, becoming cobalt externally and with a scarlet edging.

Habitat.—Coasts and large rivers of Bengal, Burma, Andamans, to the Malay Archipelago and beyond, attaining at least 9 inches in length. The specimen figured (life-size) is from the Irrawaddi.

Genus, 7—Boleophthalmus,* *Cuv. and Val.*

Branchiostegals five: pseudobranchiæ, a slit behind the fourth gill. Gill-openings narrow. Body sub-cylindrical: head oblong. Eyes very prominent, situated close together, the outer eyelids well developed. Cleft of mouth nearly horizontal, the upper jaw sometimes slightly the longer. Teeth in a single row, the anterior ones in the

* Bleeker divides his Boleophthalmi thus:—

1. *Scartelaos*, Swains. Anterior teeth in the premaxillaries unequal sized, curved, subulate, canines: in the lower jaw sharp, simple, and of medium size.
2. *Boleophthalmus*, Val. Anterior teeth in the premaxillaries, simple, conical, sharp and curved canines: in the lower jaw with their apices dilated, truncated or emarginate.

upper jaw enlarged and stronger than the others: those in the lower jaw, in a single horizontal row, of about equal size and having a pair of posterior canines near the symphysis. Two dorsal fins, the anterior with five flexible spines: the second many rayed and of about equal number to, or rather more than those in the anal: pectoral with its basal portion muscular and generally free: ventrals more or less united: caudal with its inferior edge obliquely truncated. Air-vessel present or absent. Scales when present rudimentary or small, generally largest posteriorly.

It should be remarked that although the eyes are very prominent during life, this peculiarity is not so well seen after death. Had the eyes of *B. Dussumieri, tenuis, Boddaerti* and *glaucus* in my figures been a little more prominent than delineated, accuracy as to what exists during life would not have been infringed upon.

These fishes are essentially dwellers in the mud, and if placed in an aquarium in deep water appear to be rapidly drowned.

SYNOPSIS OF SPECIES.

1. *Boleophthalmus tenuis*, D. 5/28-29, A. 26. Height of body 10 in total length. Teeth pointed. Gray along the back, white beneath, black spots on head, bands and blotches on body, end of dorsal and upper edge of caudal with black margins. Sind.
2. *Boleophthalmus Dussumieri*, D. 5/27-28, A. 26. Teeth in lower jaw with a slight lobe. First dorsal nearly as high as body, not attached to second dorsal. Gray, black spots on first dorsal and white ones on second dorsal. Bombay and Sind.
3. *Boleophthalmus dentatus*, D. 5/27, A. 26-27. Teeth on lower jaw with a slight lobe. First dorsal higher than the body and connected to the second. Gray, black spots on first dorsal and white ones on second dorsal. Bombay and Sind.
4. *Boleophthalmus glaucus*, D. 5/27, A. 25. Thirteen large teeth in front of upper jaw and 13 lateral ones: 25 sub-horizontal, equal sized, and pointed ones in lower jaw. Height of second dorsal half length of head. Greenish, dorsals longitudinally banded: upper two-thirds of caudal dark and spotted. Andamans.
5. *Boleophthalmus viridis*, D. 5/26, A. 26. Fourteen large teeth in front of upper jaw, laterally a few minute ones: 30 sub-horizontal and pointed ones in lower jaw, the outer the largest. First dorsal high. Height of second dorsal $3\frac{1}{2}$ in length of head. Greenish, with black spots on head, back, and dorsal fins. Upper two-thirds of caudal dark with black angular bands.
6. *Boleophthalmus Boddaerti*, D. 5/24-25, A. 24. Height of body 5 or 6 in total length. Vertical dark bands, body covered with opaque blue spots: dorsals with blue spots. Pectoral orange, with a dark edge.
7. *Boleophthalmus sculptus*, D. 5/25, A. 24. Scales on head and anterior portion of body in the form of flat, rounded tubercles. Greenish-olive along the back, lighter below: six vertical body bands. India.
8. *Boleophthalmus pectinirostris*, D. 5/23-24, A. 23-24. Greenish spots on body. Vertical blue spots on first dorsal fin, transverse ones on second, spots on caudal. Burma to the Malay Archipelago and beyond.

1. Boleophthalmus tenuis, Plate LXV, fig. 1.

B. v, D. 5/28-29, P. 13, V. 1/5, A. 26, C. 13.

Length of head $5\frac{1}{3}$ to $6\frac{1}{4}$, of caudal $4\frac{1}{5}$ to $4\frac{3}{4}$, height of body 10 in the total length. *Eyes*—elevated, projecting above the dorsal profile during life time, situated close together, diameter 1/6 of length of head, 1 diameter from end of snout. Greatest width of head equals $2\frac{1}{4}$ in its length, and its height equals its width. Upper jaw the longer, snout rounded in both senses, its skin loose but without any angular flap. The extent of the gape of the mouth exceeds its cleft, the maxilla reaches to below the last third of the eye. Eight or ten short barbels along the lower edge of each ramus of the lower jaw, but no central barbels under symphysis. *Teeth*—from 7 to 9 large, pointed, canines in the centre of the upper jaw on either side directed downwards, whilst laterally on either side of them are about 10 more one-third of their size, and also pointed: those in the lower jaw are compressed, sub-horizontal, pointed and about 17 on either side, two moderately sized posterior canines above the symphysis. *Fins*—first dorsal about 1/3 higher than the second, and about as high as the body, the interspace between the two fins in a large specimen equals the height of the first dorsal fin: second dorsal reaches nearly to the base of the caudal, which is lanceolate and inferiorly truncated. Pectoral as long as the head, excluding the snout: ventral one-fourth shorter and the two fins united in their whole extent. Anal beneath, but not so high as, second dorsal. Gill-opening small, before the lower half of the base of the pectoral. *Scales*—absent, a few crypts in the skin in the last part of the body. *Colours*—grayish superiorly, becoming white along the abdomen: numerous black spots on the upper surface of the head and commencement of the body, which latter has cloudy marks and bands from the second dorsal fin. First dorsal black superiorly and with some dark bands inferiorly: second dorsal with about nine or ten oblique black bands in its lower two-thirds continued on to the body, posteriorly its upper edge white with a black margin as is also upper edge of caudal. Pectoral and ventral gray, anal white: caudal blackish with white spots each having a black centre.

Habitat.—Estuaries of Kurrachee. The one figured is life-size. Largest specimen obtained $6\frac{1}{2}$ inches in length. It is common in Sind, but does not appear to extend so far east as Bombay.

2. Boleophthalmus Dussumieri, Plate LXIV, fig. 9.

Cuv. and Val. xii, p. 207, pl. 354; Gunther, Catal. iii, p. 104.

B. v, D. 5/27-28, P. 19, V. 1/5, A. 26, C. 13, L. l. ca. 125.

Length of head $5\frac{1}{3}$, of caudal $4\frac{1}{2}$ to $4\frac{2}{3}$, height of body $7\frac{3}{4}$ to 8 in the total length. *Eyes*—rather prominent, diameter 1/7 of length of head, 1 diameter from end of snout, and 1/3 of a diameter apart. Greatest width of head equals $2\frac{1}{4}$ in its length, and its height equals 1/2 its length. Snout obtuse, descending almost vertically from the eyes, the anterior end of the cleft of the mouth below the middle of the height of the head, its cleft slightly oblique, and the maxilla reaches to below the hind margin of the orbit. *Barbels*—absent. *Teeth*—three on either side of the middle of the upper jaw, pointed, and directed downwards, about 25 small, conically shaped ones along either branch of the upper jaw: about 25 truncated and notched sub-horizontal ones along either side of the lower jaw, and a pair of posterior canines. *Fins*—first dorsal nearly or as high as the body, its base slightly longer than its height, it does not extend so far as to the base of the second dorsal: the second dorsal commences midway between the anterior margin of the orbit and the base of the caudal fin, its rays are about half as high as those of the first dorsal and equal throughout. Pectoral as long as the head without the snout: ventrals entirely united, more than half as long as the head, and extending half way to the vent: anal commencing under the fourth dorsal ray, its posterior rays slightly the longest and about half as high as those of the second dorsal; caudal pointed, its lower rays truncated. *Scales*—distinct on the body, but somewhat indistinct on the head. *Colours*—gray, first dorsal purplish, covered with round black spots: the second with two or three rows of oblong white spots: caudal black.

Habitat.—Bombay and coast of Sind, to 6 inches in length.

3. **Boleophthalmus dentatus**, Plate LXIV, fig. 10.

Cuv. and Val. xii, p. 208, pl. 355.

B. v, D. 5 | 27, P. 19, V. 1/5, A. 26-27, C. 15.

Length of head 5 to $5\frac{1}{2}$, of caudal 4 to $4\frac{1}{2}$, height of body $7\frac{1}{2}$ to $8\frac{1}{2}$ in the total length. *Eyes*—rather prominent, diameter 1/7 of length of head, $1\frac{1}{2}$ to 2 diameters from the end of snout, and half a diameter or less apart. Head, its breadth equals its height and half its length. Snout somewhat obtuse, the anterior end of the cleft of the mouth is opposite about the middle of the height of the head, its cleft is slightly oblique, and the maxilla reaches to below the hind margin of the orbit. *Barbels*—absent. *Teeth*—three on either side of the middle of the upper jaw, elongate, directed downwards and slightly forwards, about 25 conical ones along either branch of the upper jaw. A pair of enlarged, recurved canines internally and behind symphysis of the lower jaw, and from 35 to 40 nearly horizontal teeth, on either branch of the lower jaw, with their summits tricuspidate, or else with a slight lobe on the outer side. *Fins*—first dorsal one fourth higher than the body below it, its rays extend beyond the membrane, which last reaches posteriorly as far as the base of the second dorsal: the second dorsal fin commences midway between the snout and the base of the caudal, its rays are about half as high as those of the first dorsal, and of equal height throughout. Pectoral as long as the head posterior to the orbit: ventrals entirely united, half as long as the head, and not extending half way to the vent: anal commencing under the fourth ray of the second dorsal, has its posterior rays a little the longest and rather above half the height of those of the second dorsal: caudal pointed, its lower rays shorter than the upper. *Scales*—only distinct in a narrow band on the abdomen, along either side of the anal fin, some along the sides below the second dorsal fin, and a few towards the head, elsewhere they look like rough points. *Air-vessel*—small, but present. *Colours*—olive gray, with dull vertical bands on the body, six or eight of which are continued to the lower half of the second dorsal fin. First dorsal purplish, covered with black spots, having whitish edges, whilst the upper margin of the fin is yellowish: second dorsal with about five rows of oblong white spots, and some black ones having white edges along the first-half of its base. Upper margin of the caudal with a white band and yellow spots between its black rays.

Whether this species and *B. Dussumieri* are in reality distinct species may be open to question, they commence to appear in Bombay, where however they are not so common as *B. Boddaerti*, but in Sind they have completely superseded it.

Habitat.—Bombay and Kurrachee, to $7\frac{1}{2}$ inches in length.

4. **Boleophthalmus glaucus**, Plate LXV, fig. 3.

B. v, D. 5 | 27, P. 19, V. 1/5, A. 25, C. 13.

Length of head 5 to $5\frac{1}{2}$, of caudal $4\frac{1}{3}$, height of body 8 to 9 in the total length. *Eyes*—prominent (more so during life than is shown in the figure), situated close together at the summit of the head, diameter 1/5 of length of head, $1\frac{1}{4}$ diameters from end of snout. Greatest width of head equals its length behind the eyes, its height is a little less. Profile from eyes to snout rather abrupt. The maxilla reaches to below the middle of the eyes. A few short tentacles along the lower edge of each ramus of the mandibles, none below the symphysis. *Teeth*—13 large, pointed, canine-like ones in front of the upper jaw, the outer of which on either side is a little enlarged and recurved, laterally there are 13 more teeth as large as those in the mandibles. Twenty-five sub-horizontal and pointed teeth in the lower jaw, all of about the same size: a pair of posterior canines above the symphysis. *Fins*—first dorsal elevated, its height being from 1/5 to 1/6 in the total length, second dorsal about 2/3 the height of the body, or half the length of the head, posteriorly it is not connected by membrane to the base of the caudal. Pectoral equals half the length of the head. Ventrals united along their whole extent. Caudal lanceolate. *Scales*—minute, but visible in the last half of the body. *Colours*—greenish, tinged with violet along the abdomen, cloudy bands on head, a few widely scattered black spots on the cheeks and upper fourth of body. Second dorsal with dark horizontal lines, most distinct posteriorly. Pectoral gray, with a

yellowish outer edge. Anal yellowish. Caudal light in its lower third, whilst superiorly it is dotted or covered with white spots surrounded by a black ring.

This fish differs from *B. viridis* in having a wider first dorsal fin, a higher second dorsal, in its dentition and colours, &c.

Habitat.—Andamans, where the specimen figured (life-size) was obtained: it, along with *Periophthalmus Koelreuteri* and other allied forms, frequents in hundreds the large mud flats, but it is most difficult to capture any as they dive down instantaneously into the semifluid mud on the slightest sign of danger. It is said that crows and birds of prey never trouble themselves to pursue them, as catching is an almost hopeless task.

5. **Boleophthalmus viridis**, Plate LXVI, fig. 5.

Gobius viridis, Ham. Buch. Fish. Ganges, pp. 42, 366, pl. 32, f. 12.
Boleophthalmus viridis, Cuv. and Val. xii, p. 213; Cantor, Catal. p. 195; Günther, Catal. iii, p. 104.
Boleophthalmus histophorus, Cuv. and Val. xii, p. 210.
Boleophthalmus aucupatorius, Richards. Voy. Sulph. Fishes, p. 148, pl. 62, f. 1, 2, and Ich. China, p. 208.
Scartelaos viridis, Bleeker, Gobioides, 1874, p. 40.

B. v, D. 5 | 26, P. 21, V. 1/5, A. 26, C. 15.

Length of head $5\frac{1}{3}$, of caudal $4\frac{1}{3}$, height of body 10 in the total length. *Eyes*—very protuberant, close together, diameter 1/6 of length of head, and $1\frac{1}{4}$ diameters from end of snout. Greatest width of head equals its height, or 1/2 its length. Profile from eye to snout rounded. The maxilla reaches to below the hind edge of the eye. A few short tentacles along the lower edge of each ramus of the lower jaw, and a larger one under the symphysis. *Teeth*—14 large, pointed, canine-like ones in front of the upper jaw, the outer of which is the largest but not recurved, laterally there are some small pointed ones. About 30 sub-horizontal and pointed teeth in the lower jaw, the outermost of which is the longest. A pair of posterior canines above the symphysis. *Fins*—first dorsal from two to three times as high as the body, and with a very narrow base: second dorsal low, its height equalling $3\frac{1}{2}$ in the length of the head, whilst posteriorly it has a membraneous connection between its last ray and the base of the caudal. Pectoral as long as the head excluding the snout. Ventrals connected together for almost their entire length. Caudal lanceolate. *Scales*—microscopic. *Colours*—greenish, becoming white beneath. Some black spots rather widely separated upon the head, body, and dorsal fins: caudal with its upper two-thirds having dark angular bands, its lower third white. In two specimens in the British Museum there are some narrow, vertical, dark bands on the sides.

Habitat.—Estuaries and coasts of Bengal to the Malay Archipelago and beyond. Specimen figured (life-size) is from Akyab.

6. **Boleophthalmus Boddaerti**, Plate LXV, fig. 2.

Gobius Boddaerti, Pall. Spicil. viii, p. 11, pl. 2, f. 4, 5; Gmel. Linn. i, p. 1201; Shaw, Zool. iv, p. 238.
Eleotris Boddaerti, Bl. Schn. p. 66.
Gobius striatus, Bl. Sch. p. 71, t. 16 (fem.).
Gobius Russell, i, p. 42, and *Nettee kunla mottah*, pl. 54.
Gobius plinianus, Ham. Buch. pp. 45, 366, pl. 35, f. 13.
Boleophthalmus Boddaerti, Cuv. and Val. xii, p. 199; Bleeker, Blenn. en Gob. pp. 5, 40, and Gobioides, 1874, p. 40; Cantor, Catal. p. 192; Jerdon, M. J. L. and Sc. 1851, p. 144; Günther, Catal. iii, p. 102; Kner, Novara Fische, p. 182.
Boleophthalmus plinianus, Cuv. and Val. xii, p. 205.
Apocryptes punctatus, Day, Proc. Zool. Soc. 1867, p. 941.

B. v, D. 5 | 24-25, P. 17, V. 1/5, A. 24, C. 13, L. l. 70, L. tr. 19-21.

Length of head $4\frac{1}{4}$ to 5, of caudal 5 to 6, height of body 5 to 6 in the total length. *Eyes*—high up, projecting, diameter from 6 to 7 in the length of head, 1 to $1\frac{1}{2}$ diameters from end of snout, and 1/4 of a diameter apart. Greatest width of head about equals its height, or its length excluding the snout. Jaws of about equal length, the maxilla reaches to below the hind edge of the eye. *Barbels*—absent. *Teeth*—the six central ones in the premaxillaries are canines pointing downwards, there are about 30 more pointed ones, but of much smaller size laterally. In the lower jaw the teeth are horizontal, about 30 on either ramus, truncated at their summits, whilst some have a slight lobe on either side: above the symphysis are a pair of posterior canines. Inferior pharyngeal bones spoon-shaped, approximating along the inner side, where a fine row of teeth exists merely at the opposed edges. *Scales*—cycloid, scarcely, if at all, imbricate on the head although extended all over it, on each scale on the head and anterior portion of the body is a rough elevation, sometimes pitted in the centre, and as the fish becomes older it appears as if in place of scales its anterior portion were covered instead with small rough elevations. 19 to 21 rows of scales between the front margins of dorsal and anal fins, and eight between their posterior margins. *Air-vessel*—present, but small. *Colours*—greenish blue, with seven or eight vertical black bands: body covered with opaque blue spots: first dorsal likewise blue-spotted, and three rows on the second, with four large series along its base. Pectoral orange, with a black edge: or dark, with an orange margin: anal and caudal blackish: ventrals purplish. In some specimens I find a few large white spots along the bases of either dorsal fin, whilst the whole of the first dorsal is densely dotted with round blue spots, and there are four rows of blue ones along the second dorsal as seen in *B. pectinirostris*. It climbs up rocks and

pieces of wood, when it resides in shallow estuaries. If kept damp it lives some time out of water, and is brought in considerable numbers to Bombay markets, in baskets covered with wet cloths.

Habitat.—Coasts and estuaries of India and Burma to the Malay Archipelago. I have not taken it West of Bombay, it being replaced in Sind by *B. tenuis*, *Dussumieri*, and *dentatus*. Burmese specimens have usually a black edge to the pectoral fin.

7. Boleophthalmus sculptus.

Günther, Catal. iii, p. 104.

B. v, D. 5 | 25, P. 15, V. 1/5, A. 24, C. 15.

Length of head $4\frac{1}{2}$, of caudal $5\frac{1}{4}$, height of body 6 in the total length. *Eyes*—diameter $4\frac{1}{2}$ in length of head, 1 diameter from end of snout, and close together. Greatest width of the head equals its length behind the eyes, whilst its height is a little less. The maxilla reaches to below the last third of the eye. *Teeth*—six large, vertical, pointed teeth in front of premaxillaries, laterally a row of fine pointed ones: those in the lower jaw truncated at their summits, some having a slight lobe on either side; a pair of posterior canines above the symphysis. *Fins*—third dorsal spine with a filamentous prolongation. Pectoral rather short. Caudal truncated. *Scales*—cycloid, those on the head and anterior portion of the body rudimentary, with flat, rounded tubercles, having a depression in their centres. In the last portion of the body they become more distinct, there are about 12 rows between the anterior portion of the bases of the second dorsal and anal fins. *Colours*—"greenish-olive, yellowish on the belly: six rather distinct darker bands descend obliquely from the back towards the belly: the anterior dorsal grayish, the other fins reddish." Günther, *l. c.*

Habitat.—India, from whence one specimen was brought by General Hardwicke.

8. Boleophthalmus pectinirostris.

Gobius pectinirostris, Gmel. Linn. i, p. 200; Bl. Schn. p. 70; Lacép. ii, p. 542; Shaw. Zool. iv, p. 245.
Apocryptes pectinirostris, Cuv. and Val. xii, p. 150.
Boleophthalmus pectinirostris, Rich. Ich. China, p. 208; Cantor, Catal. p. 193; Günther. Catal. iii, p. 103.
Boleophthalmus Boddaertii. Rich. l. c.; Temm. and Schleg. Fauna Japon. Poissons, p. 148, pl. 76, f. 3.
Boleophthalmus inornatus, Blyth, J. A. S. of B. 1860, p. 148.

B. v, D. 5 | 23-24, P. 18, V. 1/5, A. 23-24, C. 14, Vert. 11-14.

Length of head $4\frac{3}{4}$, of caudal 5, height of body 6 in the total length. *Eyes*—approximating, diameter 1/4 to 1/5 of length of head, 2/3 of a diameter from end of snout. The greatest width of the head equals a little above 1/2 its length, and its height equals its length without the snout. The maxilla extends to below the hind edge of the orbit. *Teeth*—three large, pointed, and vertically placed teeth on either side of the centre of the upper jaw, and about 40 small conical ones laterally: teeth in lower jaw horizontal, about 36 or 40 truncated and notched ones along either ramus, also a pair of posterior canines. *Fins*—spines of first dorsal filamentous and extending some distance beyond the membrane, their height being nearly twice that of the body: last dorsal rays 3/4 height of body. Pectoral as long as the head excluding the snout: ventrals reach half way to the anal, and are united in their entire extent. Caudal pointed. *Scales*—cycloid, anteriorly rudimentary, those in the posterior portion of the body are more developed, but in irregular rows, there being about 17 between the posterior extremities of the second dorsal and anal fins. *Colours*—the body with small, dark tubercles, and verdigris spots. Vertically placed blue spots on the first dorsal fin, and six or seven transverse ones on the second, where they sometimes form bands: some also on the caudal: the other fins brownish.

There are seven specimens up to 3 inches in length in the Calcutta Museum, received from the Tenasserim Provinces, where they were collected by the late Major Berdmore, and are the type of Blyth's *B. inornatus*. It seems to be a more Westerly form than most of the Indian species of this genus.

Habitat.—Coast of Burma to the Malay Archipelago and beyond.

Genus, 8—Bostrichthys,* (*Lacép.*) *C. Duméril.*

Bostrychus, Lacép.; *Philypnus*, Val.; *Bostrictis* and *Ictiopogon*, Raf.; *Philypnodon*, Bleeker; *Bostrichthys*, C. Dum.; *Lembus*, Günther.

Branchiostegals four to six: pseudobranchiæ. Gill-opening of moderate width. Body moderately elongated, sub cylindrical anteriorly: head somewhat depressed. Eyes lateral, of moderate size, not prominent. Teeth in the jaws in many rows without canines, present on the vomer, present or absent on palate and tongue. Two dorsal fins, the anterior with 6 or 7 spines, the second and the anal of about the same length (10-13). Base of pectoral slightly muscular: ventrals placed close together but not united. Scales of moderate or small size, cycloid or ctenoid, head scaled or scaleless.

* The *Philypni*, Bleeker, which possess vomerine teeth, consist of:—

1. *Philypnodon*, Bleeker. Teeth on palatines and tongue. Scales ctenoid. Head scaleless.
2. *Bostrichthys*, C. Dum. Palatines and tongue edentulous. Scales cycloid. Head scaled.
3. *Philypnus*, Val. Palatines and tongue edentulous. Scales ctenoid. Head scaled.

SYNOPSIS OF SPECIES.

1. *Bostrichthys Sinensis.* D. 6 | $\frac{1}{10-12}$, A. $\frac{1}{9}$, L. l. 140. Anterior nostril long and tubular. Dark brown, with a large black white-edged ocellus at the upper part of the base of the caudal fin. Andamans to China.

Bostrichthys Sinensis, Plate LXV, fig. 4.

Bostrychus Sinensis, Lacép. iii, p. 141, pl. 14, f. 2.
Gobius Sinensis, Cuv. and Val. xii, p. 94.
Philypnus ocellicauda, Richards. Voy. Sulphur, Fishes, pp. 58, 149, pl. 56, f. 15, 16.
Philypnus Sinenis, Richards. Ich. China, p. 210.
Philypnus ophicephalus, Bleeker, Verh. Bat. Gen. xxii, Blen. en Gob. p. 20.
Bostrichthys Sinensis, Gill, Proc. Acad. Nat. Sc. Phil. 1860, p. 125; Kner, Novara Fische, p. 186; Bleeker, Gobioides, 1874, p. 13.
Eleotris Sinensis, Günther, Catal. iii, p. 127.
Bostrychus Sinensis, Bleeker, Bintang, 1868, p. 5, and *Eleotriformes*, 1874, p. 4.
Lee-mee-jo-do-dah, Andam.

B. v, D. 6 | $\frac{1}{10-12}$, P. 15, V. 1/5, A. $\frac{1}{9}$, C. 13, L. l. 140, Vert. 12/15.

Length of head from $4\frac{1}{3}$ to $4\frac{1}{2}$, of caudal $6\frac{1}{2}$ to 7, height of body $7\frac{1}{2}$ to 8 in the total length. *Eyes*—diameter 1/5 of length of head, $1\frac{1}{2}$ diameters from end of snout, and 2 diameters apart. Head obtuse, broad, depressed. Lower jaw the longer, the maxilla reaches to below the hind edge of the eye. Greatest width of head equals its length excluding the snout, its height equals about 1/2 its length. Anterior nostril tubular and long. *Teeth*—in equal sized villiform rows in both jaws, also on a semi-oval spot on the vomer. *Fins*—first dorsal not so high as the second, a rather considerable interspace between the two fins. Pectoral and ventral of about the same length, and equalling the head excluding the snout. Caudal rounded or wedge-shaped. *Scales*—cycloid, rudimentary on the top of the head and the nape: small on the cheeks, larger on the opercles. On the body they are irregular. *Colours*—dark brown marbled, a black white-edged ocellus at the upper part of the root of the caudal fin: three bands formed of spots along the dorsal fin, caudal also vertically banded by spots.

Habitat.—Andamans, to the Malay Archipelago and China. The specimen figured (life-size) is from the Andamans, where it is not uncommon in the brackish waters, feeding on small crustacea.

Genus, 9—Eleotris,* *Gronovius.*

Branchiostegals from four to six, occasionally terminating anteriorly in a spine: pseudobranchiæ present. Gill-openings of moderate width. Body sub-cylindrical: head oblong. Eyes lateral, not prominent, and of moderate size. Teeth small, none on vomer or palatines. Two dorsal fins, the anterior with few (5-8) spines, and these sometimes filamentous: base of pectoral slightly muscular: ventrals placed close together but not united. Scales present. Air-vessel large. Anal papilla distinct. Pyloric appendages generally absent.

As in the Genus *Gobius* I considered it unadvisable to adopt minute sub-divisions, for the purpose of forming Genera, I cannot but think that the same plan had better be continued for Genus *Eleotris*, or Gobies with separated ventral fins and no teeth on the palate. Those which have an outer barbed row are likewise properly removed to separate genera, as *Mogurnda*, Gill.

Geographical distribution.—These fishes are generally found in the seas of the tropics, mostly along the shores, in estuaries, or tidal rivers, but not above tidal influence. The only one I have observed that appears

* Many of the following Genera which comprise *Eleotrii* and *Butii* of Bleeker are comprised in the above:—

No crests or serrated ridges on the head: teeth in *many rows in both jaws*, *Eleotris*, Gronov.=*Gobiomoroides*, Lacép.=*Erotelis*, Poey: anterior canines also in both jaws and the inner row in the lower enlarged, *Odonteleotris*, Gill: or simply the outer row enlarged, *Guavina*, Bleeker: head scaleless, *Belobranchus*, Bleeker: or the inner row in the lower jaw may be slightly enlarged (scales 28 to 40, isthmus narrow) *Ophiocara*, Gill: or the outer row in the upper jaw, and anteriorly the outer in the lower, which also has its inner row posteriorly enlarged (a preopercular spine), *Cheilodipterus*, H. B =*Culius*, Bleeker: or the teeth may be subequal and slender (upper surface of head scaled) *Gobiomorphus*, Gill.

Or the teeth may be in *few rows in both jaws*, the outer being enlarged in the upper, and also anteriorly in the lower as is also its posterior inner row (isthmus of medium size) *Oxyeleotris*, Bleeker.

Or the teeth may be in *many rows in the upper*, and only *a single one in the lower jaw*, as *Pogoneleotris*, Bleeker, and *Gymneleotris*, Bleeker.

Osseous crests or serrated ridges on the head: teeth in *many rows in both jaws*, crowded and of equal size, *Butis*, Bleeker; or subequal in size (head scaleless) *Gymnobutis*, Bleeker: or the outer row enlarged in either jaw (head convex) *Prionobutis*, Bleeker; or slender and not crowded, with the outer row slightly enlarged, *Odontobutis*, Bleeker.

Or there may be *many rows of teeth in both jaws*, the outer being slender and moveable, as *Dormitator*, Gill: *Asterropteryx*, Rüpp.

Or the teeth in the jaws may be fixed in *many rows in both jaws*, the outer enlarged, in the lower a posterior lateral canine. Scales large and ctenoid, *Brachyeleotris*, Bleeker: or cycloid *Hetereleotris*, Bleeker.

Or the scales may be small: teeth in *many rows in both jaws*, the outer the longer, and partly canine-like, *Pareleotris*, Gill: or with only two canines at the symphysis of the premaxillaries, and posterior canines above the symphysis of the lower jaw, *Oxymetopon*, Bleeker.

Or the teeth may be in *one or more rows in the premaxillaries*, the inner being rudimentary, or in *many in the lower jaw*, the outer the longer and unequal, a posterior lateral canine, *Valenciennesia*, Bleeker: or a single row in the upper jaw, an enlarged outer unequal row in the lower, and a large posterior curved canine, *Eleotriodes*, Bleeker.

to live in fresh water as well as brackish or saline is the *E. fusca*, which though most numerous near the coasts, is still found a hundred miles and more from the sea.

SYNOPSIS OF SPECIES.

1. *Eleotris macrolepidota*, D. 7 | $\frac{1}{8}$, A. $\frac{1}{10}$, L. l. 30. Brownish, dorsal, anal, and caudal spotted. India.

2. *Eleotris muralis*, D. 6 | $\frac{1}{12}$, A. $\frac{1}{12}$, L. l. 100. No scales on head. Two or three red longitudinal bands along the body, some on head, several on dorsal fins, and a black mark at the summit of the first dorsal, between its third and fourth spines. Seas of India to the Malay Archipelago.

3. *Eleotris sexguttata*, D. 6 | $\frac{1}{12}$, A. $\frac{1}{12}$, L. l. 75-80. Blue spots, with dark edges on the sides of the head, a black upper edge to first dorsal fin, and six violet stripes along the second, anal with two: caudal spotted. Ceylon to the Malay Archipelago.

4. *Eleotris feliceps*, D. 6 | $\frac{1}{10}$, A. 11, L. l. 27, L. tr. 12. Brownish-white, irregularly spotted and blotched with a darker colour, fins spotted. Andamans.

5. *Eleotris macrodon*, D. 6 | $\frac{1}{9}$, A. $\frac{1}{8}$, L. l. 120, L. tr. 30. Canines in jaws. Brownish. A dark ocellus at upper part of base of caudal fin: fins spotted. Estuaries of Bengal and Burma.

6. *Eleotris porocephalus*, D. 6 | $\frac{1}{9-10}$, A. $\frac{1}{7}$, L. l. 36-37, L. tr. 12-13. Twenty-five to thirty rows of scales before the dorsal fin. Brown, marbled with darker. Dorsals spotted, anal with a dark band. Andamans, Burma, and to the Malay Archipelago.

7. *Eleotris ophiocephalus*, D. 6 | $\frac{1}{8-9}$, A. $\frac{1}{7}$, L. l. 31-34, L. tr. 10-11. Fifteen rows of scales before the dorsal fin. Brown, blotched and marbled with darker. Fins banded. Africa, Andamans, and to the Malay Archipelago.

8. *Eleotris cavifrons*, D. 6 | $\frac{1}{8}$, A. $\frac{1}{8}$, L. l. 65, L. tr. 17. A preopercular spine. Scales extend to the snout, 55 rows before the dorsal fin. Brown, with a few spots on the body, dorsal and caudal barred in spots. Andamans.

9. *Eleotris fusca*, D. 6 | $\frac{1}{8}$, A. $\frac{1}{8}$, L. l. 60-65, L. tr. 16. A preopercular spine. Scales extend to the snout, 48 rows before the dorsal fin. Leaden-black, and of various colours, fins spotted. Coast of Africa and India to the Malay Archipelago.

10. *Eleotris Canarensis*, D. 6 | $\frac{1}{8}$, A. $\frac{1}{7}$, L. l. 58, L. tr. 17. Forty-two rows of scales before the dorsal fin. Dark brown, mottled: fins spotted. Mangalore.

11. *Eleotris luteus*, D. 6 | $\frac{1}{8}$, A. $\frac{1}{8}$, L. l. 50, L. tr. 12. A preopercular spine. Scales do not extend to so far as the eyes, 23 rows before the dorsal fin. Dirty-gray, with vertical bands: fins spotted. Andamans.

12. *Eleotris scintillans*, D. 6 | $\frac{1}{8}$, A. $\frac{1}{7}$, L. l. 42, L. tr. 15. Thirty-four rows of scales before the dorsal fin. Brownish, marbled with darker, a dark ocellus at upper part of base of caudal fin. Dorsals spotted, anal with a dark band. Akyab and the Andamans.

13. *Eleotris litoralis*, D. 6 | $\frac{1}{8}$, A. $\frac{1}{7}$, L. l. 35, L. tr. 11. Thirty rows of scales before the dorsal fin. Brownish, marbled with darker, dorsal and caudal fins spotted. Andamans.

14. *Eleotris caperata*, D. 6 | $\frac{1}{8}$, A. $\frac{1}{8}$, L. l. 30, L. tr. 9. Serrated ridges on the head. Interorbital space scaleless. Brown, a black blotch edged with scarlet at base of pectoral fin: vertical fins spotted. Coasts of India to the Malay Archipelago and beyond.

15. *Eleotris butis*, D. 6 | $\frac{1}{8}$, A. $\frac{1}{8}$, L. l. 28, L. tr. 9-10. Maxilla extends to below middle of the eye. Serrated ridges on head. Interorbital space scaled. Brownish, with a black blotch edged with scarlet at base of the pectoral fin: fins spotted. Seas and estuaries of India to the Malay Archipelago.

16. *Eleotris Amboinensis*, D. 6 | $\frac{1}{8}$, A. $\frac{1}{8}$, L. l. 28, L. tr. 9. Maxilla scarcely reaches to below front edge of the eye. Serrated ridges on the head. Interorbital space scaled. Brownish, a black blotch edged with yellow at base of the pectoral fin: fins spotted. Seas and estuaries of India to the Malay Archipelago.

1. Eleotris macrolepidota.

Sciæna macrolepidota, Bl. t. 298; Bl. Schn. p. 80.
Eleotris tumifrons, Cuv. and Val. xii, p. 241.
Eleotris macrolepidota, Günther, Catal. iii, p. 111.
Dormitator macrolepidota, Bleeker, Eleotriformes, 1874, p. 6.

B. vi, D. 7 | $\frac{1}{8}$, P. 13, V. 1/5, A. $\frac{1}{10}$, C. 16, L. l. 30.

Length of head, of caudal fin, and height of body, each nearly 1/4 of the total length. *Eyes*—diameter 1/4 of length of head, 1 diameter from end of snout, 3 diameters apart. Height of head 3/4 of its length. Interorbital space swollen: otherwise the upper surface of the head is flat. Cleft of mouth very oblique. The maxilla reaches to beneath the anterior margin of the orbit. *Teeth*—villiform. *Scales*—finely ctenoid on the body, those on the upper surface of the head small. *Colours*—brownish, with brown spots on the second dorsal. Bloch in his figure gives it six vertical bands on the body, and both dorsals, anal, and caudal spotted.

Habitat.—The specimen from which Bloch took his figure is stated to have come from India, and to attain 9 inches in length.

2. Eleotris muralis, Plate LXIX, fig. 1.

(Quoy and Gaim.) Cuv. and Val. xii, p. 253, pl. 357; Bleeker, Amb. and Ceram. p. 276; Günther, Catal. iii, p. 130.

Valenciennea muralis, Bleeker, Boeroe, p. 412, and Eleotriformes, 1874, p. 6.
Eleotrioides muralis, Bleeker, Goram. p. 212.

B. v, D. 6 | $\frac{1}{12}$, P. 19, V. 1/5, A. $\frac{1}{12}$, C. 13, L. l. ca. 100.

Length of head $4\frac{1}{4}$, of caudal $4\frac{1}{4}$, height of body $6\frac{3}{4}$ in the total length. *Eyes*—diameter 1/5 of length of head, $1\frac{1}{2}$ diameters from end of snout, and 1 apart. Greatest width of head equals its height or its length behind the middle of the eyes. Cleft of mouth oblique, commencing anteriorly opposite the middle of the eye: the maxilla reaches to below the front edge of the orbit. *Teeth*—a single row of pointed, rather curved, and large teeth in the premaxillaries: villiform in the lower jaw, with anteriorly an outer row of curved teeth ending laterally in one or two canines. *Fins*—dorsal spines with filamentous terminations, the third being half higher than the body: the last dorsal ray as high as the body. Pectoral nearly as long as the head: ventral reaches half way to the anal. Caudal pointed. *Scales*—none on the head, those on the body ctenoid, about 30 rows between the anterior portion of the bases of the second dorsal and anal fins. *Colours*—two or three longitudinal red bands along the upper half of the body, and which may be broken up into spots, sometimes there are also a few vertical red bands crossing the horizontal rows at right angles: three or four red bands on the head, those on the opercle being tortuous. Several rows of red spots on the first dorsal fin forming bands, and a black blotch at its summit between the third and fourth spines. Two or three red lines along the second dorsal, and one along the anal fin: caudal with red spots.

Amongst Sir Walter Elliot's collection of drawings is a coloured one of the fish captured inside a *Muræna*, at Madras, and referred to by Jerdon in the M. J. L. and Sc. 1851, p. 143, it may perhaps be the species described above. Dr. Günther identified one of Sir Emerson Tennent's drawings of Ceylon Fishes with *E. muralis*, therefore it would appear to be found off that island. Bleeker places *E. lineato-oculatus*, Kner, as a synonym of this species.

Habitat.—Seas of India to the Malay Archipelago.

3. Eleotris sexguttata.

Cuv. and Val. xii, p. 254; Bleeker, Blen. en Gob. p. 253, and Sumatra, p. 52; (Jerdon, M. J. L. and Sc. 1851, p. 143 not synon.); Günther, Catal. p. 130.
Valenciennea sexguttata, Bleeker, Boeroe, p. 412, Arou, 1873, p. 2, and Eleotriformes, 1874, p. 6.
Eleotriodes sexguttata, Bleeker, Goram. p. 212.

B. iv-v, D. 6 | $\frac{1}{12}$, P. 21, V. 1/5, A. $\frac{1}{12}$, L. l. 75-80.

Height of body 7 to 8 in the total length. *Eyes*—not one diameter apart. Jaws of equal length anteriorly. *Teeth*—in a single row of unequal size. *Fins*—dorsal spines, from the second to the fourth inclusive, produced into filaments. *Colours*—greenish, shot with rosy: blue spots, with dark edges on the side of the head: occasionally a violet spot before the dorsal fin, which latter has a black superior margin: second dorsal with six longitudinal violet stripes, anal with two: caudal with pearl-coloured ocelli edged with violet.

Jerdon's fish can hardly be identical with Cuv. and Val. The figure amongst Sir W. Elliot's drawings represents a fish with D. 6/11. Body gray, with six vertical bands, six black spots at the base of the caudal fin and a large black yellow-edged ocellus at the base of the pectoral. First dorsal white in its lower 1/3, black in its upper two-thirds: second dorsal white along its base, gray in its outer three-fourths. Caudal with a white tip. First dorsal about 1/2 the height of the second, which equals that of the body. It is marked "*Eleotris 6 guttata ?* C.V. ? *Natsooli* Tamil. *Butis.*" It appears similar to *E. Amboinensis.*

Habitat.—Ceylon to the Malay Archipelago.

4. Eleotris feliceps.

Blyth, J. A. S. of Beng. 1860, p. 146; Day, Proc. Zool. Soc. 1869, p. 517.

B. v, D. 6 | $\frac{1}{10}$, P. 15, V. 1/5, A. 11, C. 13, L. l. 27, L. tr. 12.

Length of head 1/4, of caudal 1/5, height of body 1/5 of the total length. *Eyes*—close together, 1 diameter from end of snout. Head slightly depressed, snout pointed. Lower jaw the longer. Cleft of mouth short, the maxilla only extends half way to below the orbit: no preopercular spine. *Teeth*—villiform. *Fins*—dorsal spines filiform: central caudal rays the longest. *Scales*—cycloid as far as the base of the anal fin, where they become strongly ctenoid: anteriorly they reach to the posterior margin of the orbit, and also cover the cheeks and opercles: twelve rows between the bases of the second dorsal and anal fins. *Colours*—brownish-white, irregularly spotted and blotched with a darker colour: dark bands pass downwards from the orbit: fins more or less spotted.

Habitat.—Andamans, from whence the Calcutta Museum received one specimen $1\frac{1}{2}$ inches in length.

5. Eleotris macrodon, Plate LXV, fig. 3.

Bleeker, Beng. en Hind. p. 104, t. 2, f. 1; Günther, Catal. iii, p. 129.
Odonteleotris macrodon, Gill, Bleeker, Eleotriformes, 1874, p. 14.

B. v, D. 6 | $\frac{1}{9}$, P. 17, V. 1/5, A. $\frac{1}{8}$, C. 13, L. l. 120, L. tr. 30.

Length of head $4\frac{1}{4}$, of caudal 6, height of body 6 in the total length. *Eyes*—diameter $6\frac{1}{2}$ in length of head, $1\frac{3}{4}$ diameters from end of snout, and 2 apart. Upper surface of head flattened, snout slightly elevated.

Greatest width of head equals its length behind the eyes, and its height equals half its length. Lower jaw the longer. Cleft of mouth oblique, commencing anteriorly opposite the middle of the eyes, the maxilla reaching to below the centre of the orbit. No spine on preopercle. Anterior nostril tubular. A small barbel is said to exist on each side of the upper jaw. *Teeth*—several villiform rows in both jaws, an outer row of enlarged conical ones in front of the premaxillaries, consisting of from eight to ten, two of which are large canines: in the lower jaw from four to six conical canines anteriorly, whilst the inner row of the villiform ones is very slightly the largest. *Fins*—dorsals of about the same height and equal to half of that of the body. Pectoral as long as the head behind the eyes: ventral reaching a little above half way to the anal. Caudal rounded. *Scales*—cycloid, extending in irregular rows over body and head, except at front of snout and lower jaw, about 70 rows in front of dorsal fin. The posterior half of caudal scaled. *Colours*—brownish, second dorsal with several brown spots. A dark ocellus edged with light at the upper part of the base of the caudal fin.

Habitat.—Estuaries and mouths of large rivers in lower Bengal and Burma, attaining at least $4\frac{1}{2}$ inches in length.

6. Eleotris porocephalus, Plate LXVII, fig. 1.

Eleotris porocephala, Cuv. and Val. xii, p. 237; Cantor, Catal. p. 195; Bleeker, Amboina, p. 344.
Eleotris porocephaloides, Bleeker, Sumatra, p. 511; Günther, Catal. iii, p. 109.
Eleotris Cantoris, Günther, Catal. iii, p. 108.
Ophiocara porocephala, Bleeker, Eleotriformes, 1874, p. 5.

B. v, D. 6 | $\frac{1}{9}$-$\frac{1}{10}$, P. 15, V. 1/5, A. $\frac{1}{7}$, C. 15, L. l. 36-37, L. tr. 12-13.

Length of head $3\frac{1}{2}$ to $3\frac{2}{3}$, of caudal 5 to 6, height of body $4\frac{3}{4}$ to $5\frac{1}{4}$ in the total length. *Eyes*—diameter from 1/5 to 1/6 in length of head, $1\frac{1}{4}$ to $1\frac{1}{2}$ diameters from end of snout, and 2 to $2\frac{1}{4}$ diameters apart. Head obtuse, flat, depressed. Greatest width of head equals its length excluding the snout, and its height equals its length behind the eye. Lower jaw the longer, the maxilla reaches to rather behind the centre of the eye. Anterior nostril tubular. *Teeth*—in villiform rows, the outer row in the lower jaw slightly the longest and pointed. *Fins*—the two dorsals of about equal height or two-thirds that of the body, the last dorsal ray scarcely reaches the base of the caudal fin. Pectoral equals the length of the head behind the middle of the eyes, the ventral is rather shorter. Caudal rounded. *Scales*—ctenoid, extended over the head, except on front portion of snout, those on the upper surface of the head smaller than those on the body and from 25 to 30 rows anterior to the base of the dorsal fin, there are about 12 rows between the eye and angle of the preopercle, seven or eight across the opercle, and 13 to 14 between the anterior portions of the bases of the second dorsal and anal fins. *Colours*—deeep blackish-brown, marbled with darker: second dorsal with three or four rows of spots: a dark band along the anal. The body may have numerous light spots upon it and also on the second dorsal fin.

Habitat.—Andamans, Burma, to the Malay Archipelago. The specimen figured (life-size) is from the Andamans.

7. Eleotris ophiocephalus, Plate LXVII, fig. 2.

Eleotris ophiocephalus, (Kuhl. and v. Hass.) Cuv. and Val. xii, p. 239; Bleeker, Blenn. en Gob. p. 22; Cantor, Catal. p. 196; Günther, Catal. iii, p. 107; Day, Proc. Zool. Soc. 1870, p. 694.
Eleotris margaritacea, Cuv. and Val. xii, p. 240.
Eleotris viridis, Bleeker, Madura, p. 22.
Ophiocara ophiocephala, Bleeker, Eleotriformes, 1874, p. 15.
A-rig-dah and *Mu-took-dah*, Andam.

B. v, D. 6 | $\frac{1}{8-9}$, P. 17, V. 1/5, A. $\frac{1}{7}$, C. 15, L. l. 31-34, L. tr. 10-11, Cæc. pyl. 2.

Length of head $3\frac{3}{4}$ to $4\frac{1}{3}$, of caudal $5\frac{1}{2}$ to 6, height of body 4 to 5 in the total length. *Eyes*—diameter 1/5 to 1/6 of length of head, 1 to $1\frac{1}{2}$ diameters from end of snout, and 2 to 3 apart. Head obtuse and depressed, its upper surface flat, its greatest width equalling its length without the snout, and its height being a little less. Lower jaw the longer, cleft oblique, commencing anteriorly opposite the middle of the eyes, the maxilla reaches to below the front edge of the orbit. Anterior nostril tubular. *Teeth*—in numerous villiform rows in both jaws, the outer being rather enlarged and pointed: palate edentulous. *Fins*—first dorsal spines rather fine, and equalling about 1/2 the height of the body, last dorsal rays prolonged, reaching to nearly or quite the base of the caudal fin. Pectoral as long as the head excluding the snout, the ventral equally long and reaching the vent. Caudal rounded. *Scales*—finely ctenoid, 15 rows in front of first dorsal fin and reaching to the snout, also covering the cheeks and opercles: those on the top of the head as large as those on the body. *Pyloric appendages*—two. *Colours*—olive brown, some irregular blotches along the sides, whilst three black bands radiate from the eye: sometimes a light ocellus edged with dark at the upper half of the base of the pectoral fin, or some dark markings: vertical fins with light margins: a darkish band along the second dorsal, anal, and ventral fins: soft dorsal sometimes with two narrow darkish bands.

Dr. Bleeker observes that yellow spots are very well marked on the second dorsal and anal fin in this species of *Ophiocara*. I did not see such at the Andamans where I captured many, but was only there in December and January, and season may affect their colours.

Habitat.—Andamans, the coast of Africa, and Malay Archipelago, to at least $9\frac{1}{2}$ inches in length.

8. Eleotris cavifrons, Plate LXV, fig. 6.

Blyth, J. A. S. of Beng. 1860, p. 145; Day, Proc. Zool. Soc. 1869, p. 517.

B. v, D. 6 | $\frac{1}{8}$, P. 13, V. 1/5, A. $\frac{1}{8}$, C. 15, L. l. 65, L. tr. 17.

Length of head $3\frac{1}{2}$ to $3\frac{3}{4}$, of caudal 5 to $5\frac{1}{4}$, height of body $5\frac{1}{2}$ to $6\frac{1}{2}$ in the total len th. *Eyes*—diameter 1/5 to 1/6 of length of head, 1 to $1\frac{1}{2}$ diameters from end of snout, and 1 to $1\frac{1}{4}$ apart. Head depressed. Its greatest width equals its length excluding the snout, and its height equals half its length. A deep depression exists over the orbits. Lower jaw the longer, cleft of mouth oblique, commencing anteriorly opposite the upper edge of the eye, the maxilla reaches to below the hind edge of the orbit. A well marked spine pointing downwards at the angle of the preopercle. Anterior nostril somewhat tubular. *Teeth*—villiform in both jaws, the outer row in the premaxillaries rather enlarged, whilst the inner row is likewise a little larger than the outer ones and directed somewhat inwards. Four or five large canine-like teeth in the front of the lower jaw, whilst its inner row is also enlarged, terminating laterally in a canine-like tooth. *Fins*—first dorsal not quite so high as the second, the last rays of which equal the height of the body. Pectoral as long as the head behind the middle of the eyes, ventral extends half way to the anal. Caudal obtusely rounded. *Scales*—cycloid and small anteriorly, ctenoid on the body, about 55 rows before the dorsal fin, they extend forwards to the snout and over the opercle and subopercle, but there are none on the cheeks, which however have little rows of warts. *Colours*—light brown, with dark bands radiating from the orbits: a few dark spots on the body: dorsals and caudal barred in spots.

This fish appears to be an *Oxyeleotris*, Bleeker.

Habitat.—Andamans, up to 4 inches in length.

9. Eleotris fusca, Plate LXV, fig. 7.

Pœcilia fusca, Bl. Schn. p. 453.
Cobitis pacifica, Forst. Desc. Anim. ed. Licht. p. 235.
Cheilodipterus culius, Ham. Buch. pp. 55, 367, pl. 5, f. 16.
Eleotris nigra, Quoy and Gaim, Voy. Freyc. Zool. p. 259, pl. 6, f. 2; Cuv. and Val. xii, p. 233; Bleeker, Beng. p. 105, t. i, f. 3; Jerdon, M. J. L. and Sc. 1848, p. 149.
Eleotris Mauritianus, Benn. Proc. Zool. Soc. i, p. 166.
Culius niger, Bleeker, Boeroe, p. 411.
Eleotris incerta, Blyth, J. A. S. of Beng. 1860, p. 146.
Eleotris fusca, Günther, Catal. iii, p. 125; Day, Fish. Mal. p. 115, and Proc. Z. S. 1869, p. 517; Kner, Novara Fische, p. 186; Playfair, Fish. Zanz. p. 74.
Eleotris Soaresi, Playfair, Fish. Zanz. p. 74, pl. ix, fig. 4.
Culius fuscus, Bleeker, Eleotriformes, 1874, p. 15.
Poollan, Mal.: *Bundi* and *Balah kera*, Ooriah.

B. vi, D. 6 | $\frac{1}{8}$, P. 18, V. 1/5, A. $\frac{1}{8}$, C. 12, L. l. 60-65, L. tr. 16, Vert. 11/14.

Length of head 4, of caudal $5\frac{3}{4}$ to 6, height of body 5 to 6 in the total length. *Eyes*—diameter 1/6 to 1/7 of length of head, 1 to $1\frac{1}{2}$ diameters from end of snout, and $1\frac{1}{2}$ to 2 diameters apart. Head depressed, its greatest width slightly exceeding its height and equalling its length excluding the snout. Lower jaw rather the longer: the maxilla reaches to below the middle of the orbit. Angle of preopercle armed with a short spine directed downwards and forwards, which usually becomes blunted with age. *Teeth*—in many villiform rows, the outer in the upper jaw being rather wide asunder and twice the size of the inner ones. In the lower jaw there are usually, not invariably, a few enlarged ones anteriorly in an outer row, whilst laterally there are some rather larger sized, pointed teeth. *Fins*—first dorsal spines weak, more than half as high as the body, but 1/4 less than the rays of the second dorsal. Pectoral as long as the head excluding the snout. Anal similar to the second dorsal. Caudal wedge-shaped. *Scales*—cover the body, and head superiorly as far forwards as the snout, the opercles and cheeks: occasionally those below the eyes and on the sub- and inter-opercles are rudimentary or even absent, in such cases lines of fine warts are usually seen. There are about 48 rows anterior to the dorsal fin, and they are rather minute between the eyes: 16 rows between the anterior extremities of second dorsal and anal fins, and 14 between their posterior extremities. Those on the body are ctenoid. *Colours*—leaden-black, lighter on the abdomen, which sometimes has a yellow tinge: horizontal bars on the dorsal fins, sometimes vertical ones on the caudal. Occasionally its upper surface is of a light stone-colour. Its markings and colours are subject to great variation.

Jerdon remarks that it conceals itself under stones and amongst weeds, remaining motionless for hours. Its movements are slow and it is fond of attaching itself vertically, with its head downwards, to the side of the vessel in which it may be confined.

Habitat.—Coasts of India to the Malay Archipelago, also the African coast, &c. to 8 inches in length.

10. Eleotris Canarensis, Plate LXIX, fig. 2.

B. vi, D. 6 | $\frac{1}{8}$, P. 16, V. 1/5, A. $\frac{1}{7}$, C. 15, L. l. 58, L. tr. 17.

Length of head $3\frac{3}{4}$, of caudal $6\frac{1}{2}$, height of body $6\frac{1}{2}$ in the total length. *Eyes*—diameter $4\frac{1}{2}$ in length of head, 3/4 of a diameter from end of snout, and nearly 1 apart. Greatest width of head equals its

length behind the middle of the eye, and its height equals half its length. Upper surface of the head flat. Snout elevated. Lower jaw the longer: cleft of mouth very oblique, commencing opposite the upper edge of the eye: the maxilla reaches to below the middle of the orbit. Interorbital space flat. No serrated ridges on the head, nor any preopercular spine. *Teeth*—in numerous villiform rows, very small, and equal sized. *Fins*—first dorsal spines weak, not produced, equal to two-thirds of the height of the body, and nearly as long as the posterior rays of the second dorsal. Pectoral nearly as long as the head, and longer than the ventral. Caudal pointed. *Scales*—strongly ctenoid behind the head and base of first dorsal fin, those on the upper surface of the head are nearly as large as those on the body, they extend forwards to the snout, and cover the cheeks and opercles. There are 42 rows anterior to the base of the first dorsal fin, six rows between the orbit, 17 rows between the anterior portions of the origins of the second dorsal and anal fins, and 15 between their posterior portions. *Colours*—dark brown, mottled with black: pectoral yellow, with several black bands of spots: first dorsal black, with a white band along its lower third: second dorsal with six or seven bands of spots: anal with bands of spots: caudal reticulated with black spots, and having a black band at its base: ventral spotted.

Habitat.—Mangalore, where the specimen figured (life-size) was obtained.

11. Eleotris lutea.

B. vi, D. 6 | $\frac{1}{8}$, P. 15, V. 1/5, A. $\frac{1}{8}$, C. 15, L. l. 50, L. tr. 12.

Length of head $3\frac{1}{2}$, of caudal $5\frac{1}{2}$, height of body 4 in the total length. *Eyes*—diameter 1/4 of length of head, 3/4 of a diameter from end of snout, and also apart. Greatest width of head equals its length behind the eyes, and its height equals about the same. Upper surface of head and interorbital space flattened, snout slightly elevated. Lower jaw the longer, cleft of mouth oblique, commencing opposite the upper edge of the eye, the maxilla reaches to below the middle of the orbit. Anterior nostril tubular. A spine directed downwards at the angle of the preopercle. *Teeth*—in numerous villiform rows, the outer in the upper jaw being rather enlarged, as are also a few anteriorly in the lower jaw, whilst laterally its inner row is likewise enlarged. *Fins*—first dorsal spines with filamentous terminations extending a short distance beyond the membrane, height equals half that of the body, second dorsal highest anteriorly, where it equals 2/3 of that of the body, and is similar to the anal. Pectoral as long as the head without the snout: ventral of similar length. Caudal wedge-shaped. *Scales*—ctenoid on the body, superiorly they do not extend so far forwards as the eye, whilst there are none on the sides of the head: 23 rows before the dorsal fin: 12 between the origins of second dorsal and anal, and 10 between their posterior extremities. *Colours*—of a dirty-grayish, with vertical bands most distinct in the posterior half of the body: many dark spots on head: dorsals and anal with bands of black spots: caudal nearly black, and slightly reticulated.

This species of *Culius*, Bleeker, differs from *E. fusca* in the fewer number of scales on the body, scaleless head, and lesser width of interorbital space.

Habitat.—Andamans.

12. Eleotris scintillans, Plate LXV, fig. 8.

Blyth, J. A. S. of Bengal, 1860, p. 146; Day, Proc. Zool. Soc. 1869, p. 517, and 1870, p. 693.

B. v, D. 6 | $\frac{1}{8}$, P. 15, V. 1/5, A. $\frac{1}{7}$, C. 13, L. l. 42, L. tr. 15.

Length of head $3\frac{3}{4}$, of caudal $4\frac{1}{2}$, height of body $4\frac{1}{2}$ in the total length. *Eyes*—diameter 1/5 of length of head, $1\frac{1}{4}$ diameters from end of snout, and also apart. Head rather obtuse, flattened superiorly, its greatest width equals its height or its length behind the eyes. Lower jaw the longer. Cleft of mouth oblique, commencing anteriorly opposite the upper third of the eye: the maxilla reaches to below the middle of the orbit. Anterior nostril in a short tube. No spine on preopercle. *Teeth*—villiform, the outer row in the lower jaw somewhat the larger. *Fins*—first dorsal fin equals about half the height of the body, and terminates only a short distance anterior to the base of the second dorsal, the posterior rays of which reach to the base of the caudal, and equal 4/5 of the height of the body. Pectoral as long as the head behind the middle of the eyes: ventral reaches more than half way to the anal. Caudal rounded. *Scales*—on body and head excluding the front of the snout and the lower jaw, they are ctenoid except on the head, 34 rows anterior to the base of the first dorsal fin, 15 between the anterior portion of the bases of the second dorsal and anal. *Colours*—brownish, marbled with darker, and the scales shot with light spots when in a certain position. Both dorsals with about three rows of spots, and a dark edge having a light margin. Anal with a dark band in its outer half having a light edge. Caudal dark, with a white edge, sometimes it and the anal are spotted: a dark ocellus at upper part of base of caudal fin.

This fish belongs to Genus *Ophiocara*, Bleeker, MSS. It is very closely allied to *E. porocephalus*, of which it may be the young.

Habitat.—Akyab and the Andamans, the one figured is life-size.

13. Eleotris litoralis.

B. vi, D. 6 | $\frac{1}{8}$, P. 15, V. 1/5, A. $\frac{1}{7}$, C. 13, L. l. 35, L. tr. 11.

Length of head $3\frac{3}{4}$, of caudal 5, height of body 5 in the total length. *Eyes*—diameter $3\frac{3}{4}$ in length of head, 3/4 of a diameter from end of snout, and $1\frac{1}{3}$ apart. Greatest width of head equals its height or its length

behind the eye. Upper surface of head nearly flat. Snout slightly elevated. Lower jaw the longer. Cleft of mouth rather oblique, commencing opposite the upper edge of the eye. The maxilla reaches to below the middle of the eye. No serrated ridge on the head or preopercular spine. Anterior nostril tubular. *Teeth*—in numerous closely set villiform rows in both jaws, the inner of which is slightly the larger. *Fins*—spines of first dorsal weak, extending slightly beyond the membrane, two-thirds as high as the body and equal to the posterior rays of the second dorsal. Pectoral as long as the head behind the middle of the eyes, ventral a little shorter, but reaching more than half-way to the base of the anal. Caudal wedge-shaped. *Scales*—ctenoid on the body, those on the upper surface of the head extend forwards to the snout, there are 30 rows before the dorsal fin not much smaller than those on the body, seven rows between the orbits, eleven between the origins of second dorsal and anal fins, and eight between their posterior extremities. Large scales on the cheeks and opercles. *Colours*—brownish, marbled with darker, fins very dark due to fine black dots, and three or four bars of spots on the dorsal spines and rays. Caudal blackish. Anal with a black band along its centre and an external white edge.

Habitat.—One specimen, a little over 3 inches in length, from the Andaman islands.

14. Eleotris caperata.

Eleotris caperatus, Cantor, Catal. p. 197.
Eleotris koilomatodon, Bleeker, Blen. en Gob. p. 21.
Eleotris caperata, Günther, Catal. iii. p. 117; Day, Proc. Zool. Soc. 1870, p. 694.
Prionobutis koilomatodon, Bleeker, Eleotriformes, 1874, p. 5.
Oo-suf-foo, Mugh.

B. v, D. 6 | $\frac{1}{8}$, P. 21, V. 1/5, A. $\frac{1}{8}$, C. 15, L. l. 30, L. tr. 9.

Length of head 4, of caudal $4\frac{1}{2}$, height of body $5\frac{1}{4}$ in the total length. *Eyes*—diameter 1/4 of length of head, 1 diameter from end of snout, and 1/2 a diameter apart. Greatest width of the head equals its height or its length behind the middle of the eyes. Snout rather elevated, with a slight transverse depression posterior to it: the maxilla reaches to below the first third of the eye. Supraorbital margin rather strongly serrated, likewise a serrated ridge along either side of the posterior limb of the premaxillary. *Teeth*—in villiform rows in both jaws, with the outer enlarged. *Fins*—first dorsal spines weak, and 3/4 the height of the body: the last rays of the second dorsal equal to the height of the body. Caudal rounded. *Scales*—ctenoid, about 12 rows anterior to the dorsal fin, none on the interorbital space. No rudimentary scales as a rule at the base of those on the body. *Colours*—leaden brown, fins blackish, especially the first dorsal: a deep black blotch, edged with scarlet, at the base of the pectoral fin: the second dorsal, caudal, and anal more or less spotted.

Habitat.—Coasts of India, the Andamans, to the Malay Archipelago, China, and beyond.

15. Eleotris butis, Plate LXVII, fig. 3.

Cheilodipterus butis*, Ham. Buch. Fish. Ganges, pp. 57, 367; Gray and Hard. Ill. Ind. Zool. ii, pl. 93, f. 3 (from H. B. MSS.).
Eleotris humeralis, Cuv. and Val. xii, p. 246; Bleeker, Blen. en Gob. pp. 5, 22.
Eleotris butis, Cantor, Catal. p. 196; Günther, Catal. iii, p. 116; Day, Fish. Malabar, p. 114.
? *Eleotris melanopterus*, Bleeker, Ceram. p. 707.
Eleotris prismatica, Bleeker, Madura, p. 23.
Butis butis, Bleeker, Eleotriformes, 1874, p. 16.
Kullahray, Mal.

B. v, D. 6 | $\frac{1}{8}$, P. 21, V. 1/5, A. $\frac{1}{8}$, C. 13, L. l. 28, L. tr. 9-10.

Length of head 3 to $3\frac{1}{3}$, of caudal 6, height of body $5\frac{1}{3}$ to $5\frac{1}{2}$ in the total length. *Eyes*—diameter 5 to 6 in length of head, $1\frac{3}{4}$ diameters from end of snout, and also apart. Head broad and anteriorly depressed, the dorsal profile rather concave from the occiput to the snout. The greatest width of head equals a little more than half its length, and its height is slightly less. Lower jaw the longer. Cleft of mouth commences opposite the upper edge of the eye. The maxilla reaches to below the middle of the eye. A finely serrated ridge passes along the posterior and superior edges of the orbit, from which it is divided by two rows of fine scales: serrated ridges also exist on either side of the snout, but all these serrations appear liable to variation, being usually mostly distinct in the young. *Teeth*—in numerous fine villiform rows, none of which are enlarged. *Fins*—first dorsal 2/3 of the height of the body, not so high as the second, the posterior rays of which equal 3/4 of the height of the body. Pectoral as long as the head without the snout: ventral reaches rather above half-way to the anal. Caudal cut rather square. *Scales*—ctenoid on the body, in large specimens there are generally about five or even more rudimentary ones at the base of each large one. They cover the head except the front of the snout and its under surface, there are about 25 rows between the base of the first dorsal fin and the hind edge of the eye. Interorbital space nearly flat and covered with small scales, those on the preorbital and below the eyes are usually smaller than those on the preopercle.

* I overlooked the fact (see p. 264, ante) that *Cheilodipterus panijus*, Ham. Buch. pp. 57, 367, belongs to an entirely different family, and is *Sillago domina*, C. V., or perhaps should be termed *Sillago panijus*, Ham. Buch. The figure had been abstracted from Ham. Buch. original collection in Calcutta, but a duplicate of it, with the name omitted, is present amongst the copies of the missing ones.

Nine or ten rows between the bases of the second dorsal and anal fins. *Colours*—depend very much on locality, generally leaden or brownish, sometimes blotched with darker. A scarlet spot at the base of the pectoral fin, divided in the centre by a round black mark. First dorsal nearly black: the second, the anal, and the caudal yellowish with bands of spots, upper edge of caudal sometimes reddish.

Habitat.—Seas and estuaries of India to the Malay Archipelago, attaining about 4 inches in length. The specimen figured (life-size) is from Calcutta.

16. Eleotris Amboinensis.

? Bleeker, Amboina, iv, p. 343; Günther, Catal. iii, p. 117; Day, Proc. Zool. Soc. 1869, p. 303.
Eleotris buccata, Blyth, J. A. S. of Beng. 1860, p. 145.
? Butis Amboinensis, Bleeker, Eleotriformes, 1874, p. 5.
Prionobutis buccata, Bleeker, Eleotriformes, 1874, p. 5.
Gagi-balah-kera, Ooriah.

B. v, D. 6 | $\frac{1}{8}$, P. 19, V. 1/5, A. $\frac{1}{8}$, C. 13, L. l. 28, L. tr. 9.

Length of head $3\frac{3}{4}$, of caudal 5 to $5\frac{1}{4}$, height of body 7 in the total length. *Eyes*—diameter 1/5 of length of head, $1\frac{3}{4}$ diameters from end of snout, and $1\frac{1}{4}$ apart. Dorsal profile nearly horizontal, snout depressed. Greatest width of head equals its length without the snout, and its height equals nearly half its length. Lower jaw somewhat the longer: cleft of mouth commences opposite the upper edge of the eye: the maxilla reaches to nearly below the front edge of the eye. Upper and hind edge of orbit minutely serrated, also two serrated ridges along either side of the snout. *Teeth*—in numerous villiform rows in both jaws, the outer row in the premaxillaries consists of widely separated pointed ones, much larger than the villiform bands, and its inner row is rather horizontal: the outer row in the lower jaw is anteriorly similar to that in the premaxillaries; whilst the inner row laterally is enlarged. *Fins*—dorsal spines weak, about 1/2 the height of the body: anterior rays of second dorsal as high as the body and higher than the posterior ones. Pectoral nearly as long as the head: ventral reaches above half way to vent. Caudal rounded. *Scales*—feebly ctenoid on the body, more strongly so on the cheeks: 18 rows between the base of the dorsal fin and hind edge of the eye, anteriorly they extend forwards to the snout, those in the interorbital space not being very small. Nine rows between the second dorsal and anal. A few scales on the body have a rudimentary one at their base. *Colours*—brownish, sometimes vertically banded, first dorsal dark, second yellowish, with rows of brown spots on the rays. A large black spot surrounded by yellow at the base of the pectoral fin: anal and caudal brown dotted, and having reddish margins.

This species differs from *E. caperata* in having no elevation of snout, and the interorbital space being scaled. From *E. butis* in having an outer, widely set, enlarged row of teeth. Bleeker's species *E. Amboinensis* is in a group having "*Dentes utraque maxilla æquales conferti*," consequently the above may not be his species.

Habitat.—Seas and estuaries of India to the Malay Archipelago.*

Genus, 10—Gobioides, *Lacépède.*

? Tænioides, Lacép.; *Amblyopus*, Cuv. and Val.; *Ognichodes* and *Psilosomus*, Swains.; *Odontamblyopus*, Bleeker.

Branchiostegals five: gills four: pseudobranchiæ absent. Body elongated: head oblong: no cavity above the opercles. Lower jaw prominent, causing the cleft of the mouth to be directed upwards. Eyes lateral, minute or indistinct. Teeth in a band, with a single anterior row of large, curved, conical, and distantly placed ones: a pair of posterior canines above the symphysis of the lower jaw may be present or absent. The first portion of the dorsal fin, consisting of five undivided rays is separated by an interval from the soft portion, in the centre of which is a single sixth undivided ray. Second portion of dorsal and anal with many rays and more or less confluent with the caudal: ventrals united. Scales rudimentary or absent. Air-vessel, when present, small or large.

Bleeker separates *Gobioides*, Lacép., from *Tænioides*, Lacép., partly due to their being deficient in posterior canines which *G. Broussonetti* is said to be without. But Lacépède's type of *Gobioides* is *G. anguillaris*, which has posterior canines, whilst his *Tænioides* is stated to have no caudal fin.

Geographical distribution.—These fishes are found along the coasts, estuaries and within tidal influence throughout India to the Malay Archipelago, China, and Japan. They mostly delight in muddy localities and use their teeth very freely as organs of attack or defence.

These following seven species may be thus subdivided:—

A. *A pair of posterior canines above the symphysis of the lower jaw.*

a. Vertical fins densely enveloped in skin, *G. anguillaris.*
b. Vertical fins not enveloped in skin, *G. Buchanani, G. rubicundus, G. tenuis.*

* *Atherina danius*, Ham. Buch. Fish. Ganges, pp. 222, 381; *Eleotris danius*, Bleeker Beng. en Hind.; *Cestreus minutus*, McClell. Cal. Journ. Nat. Hist. ii, p. 151, pl. iv, f. 2 may belong to this genus. D. 4-5 | 8-9, P. 7, V. 6, A. 10-12, C. 13. Appearance that of a *Mugil*. elongated, compressed. Upper surface of head flat: three protuberances on the nape. *Eyes*—large, prominent. *Teeth*—in two rows of forked ones. *Fins*—caudal ends in a crescent. *Scales*—ctenoid, very thin, none on the head. *Colours*—back dotted, silvery-white on the abdomen. *Habitat*—Mahananda and Ganges rivers, to one inch in length.

B. *No posterior canines above the centre of the lower jaw.*

a. Vertical fins densely enveloped in skin, *G. gracilis, G. cæculus, G. cirratus.*

SYNOPSIS OF SPECIES.

1. *Gobioides gracilis*, D. 6 | 47-49, A. 47-49. Height of body 18½ to 20 times in the total length. No posterior canines in the lower jaw. Vertical fins enveloped in skin and continuous with the dorsal. Pectoral short. Bluish or tinged with red. Seas of India to the Malay Archipelago.

2. *Gobioides anguillaris*, D. 6 | 45-47, A. 44-45. Height of body 14 to 18 times in the total length. Fourteen to 16 large teeth in either jaw: a pair of posterior canines in the lower. Vertical fins enveloped in skin and continuous with the caudal. Pectoral short. Pinkish, caudal dark.

3. *Gobioides cæculus*, D. 6 | 40-44, A. 38-45. No posterior canines in the lower jaw. Vertical fins enveloped in skin and separated from the caudal by a notch. Pectoral short. Bluish or reddish. Seas, estuaries and coasts of India.

4. *Gobioides cirratus*, D. 6 | 43, A. 43. Height of body 12½ times in the total length. From 8 to 10 large teeth in the upper and 6 to 8 in the lower jaw: no posterior canines. Vertical fins enveloped in skin and separated from the caudal by a notch. Pectoral short. Bright pink. Hooghly.

5. *Gobioides Buchanani*, D. 6 | 42, A. 36. Height of body 12 to 14 times in the total length. Eight large teeth anteriorly in either jaw: a pair of posterior canines. Vertical fins not enveloped in skin, continuous with the caudal. Pectoral short. Brownish, fins black. Coasts of the Bay of Bengal to Burma.

6. *Gobioides rubicundus*, D. 6 | 35-39, A. 33-36. Height of body 12 times in the total length. A pair of posterior canines in the lower jaw. Vertical fins not enveloped in skin and more or less continuous with the caudal. Pectoral of moderate length. Greenish olive, caudal black.

7. *Gobioides tenuis*, D. 6 | 33, A. 32. Height of body 20½ times in the total length. A pair of posterior canines in the lower jaw. Vertical fins not enveloped in skin and continuous with the caudal. Pectoral of moderate length. Roseate, caudal dark.

1. Gobioides gracilis.

Amblyopus gracilis, Cuv. and Val. xii, p. 166; Bleeker, Blen. en Gob. p. 38; Günther, Catal. iii, p. 134.

B. v, D. 6 | 47-49, P. 17, V. 1/5, A. 47-49, C. 11.

Length of head 10½ to 11, of caudal 10½, height of body 18½ to 20 times in the total length. *Eyes*—minute. Greatest width of head equals one-third of its length and its height rather above half of its length. Cleft of mouth oblique, lower jaw the longer and with several barbels on its anterior surface. *Teeth*—about ten almost vertical and large pointed teeth in the outer row in either jaw, posterior to which are several rows of small pointed teeth, no posterior canines. *Fins*—densely enveloped in skin, dorsal and anal continuous with the caudal. Pectoral short, 33 times in the total length: ventral 10½ in the total length. Caudal pointed. *Scales*—absent. *Colours*—olive, with the fins, especially the caudal, rather darker.

Habitat.—Seas of India to the Malay Archipelago. This is not I believe a common species in India, my single specimen from Madras is 7 inches long. I saw a species at Calcutta which I believe to be the same, it came from the Hooghly, but I have mislaid it. It is not figured amongst Sir W. Elliot's fishes.

2. Gobioides anguillaris, Plate LXVII, fig. 4.

Gobius anguillaris, Linn. Syst. i, p. 450; Gmel. Linn. p. 1201; Bl. Schn. p. 71.
? *Tænioides Hermannii*, Lacép. ii, pp. 532, 533, pl. 14, f. 1; Bleeker, Gobioides, 1875, p. 42.
Gobioides anguilliformis, Lacép. ii, pp. 576, 577.
Cepola Hermanniana, Shaw, Zool. iv, p. 191.
Amblyopus Hermannianus, Cuv. and Val. xii, p. 159, pl. 350; Swainson, Fishes, ii, p. 279; Bleeker, Beng. en Hind. p. 103; Cantor, Catal. p. 190; Jerdon, M. J. L. and Sc. 1851, p. 144; Day, Fish. Malabar, p. 116.
Ahra ramah, Tel.

B. v, D. 6 | 45-47, P. 15, V. 1/5, A. 44-45, C. 13.

Length of head 7½, of caudal 10 to 10½, height of body 14 to 18 in the total length. *Eyes*—minute. Greatest width of head equals 2/3 to 3/5 of its length, and its height equals 3/4 of the same extent. Lower jaw the longer and anterior, with its cleft nearly vertical. A tubercle at the symphysis of the lower jaw with a pair of short barbels, sometimes two more posteriorly. *Teeth*—of comparatively moderate size, about 16 large ones in the anterior row in the premaxillaries, and 14 in the lower jaw, behind these there are villiform ones, and a pair of posterior canines above the symphysis of the lower jaw. *Fins*—dorsal enveloped in skin and not so high as the body, it is not separated from the caudal (as a rule) by any notch, but in some instances is half, in others entirely notched. Pectoral fleshy in its basal half, and not quite half so long as the ventral which is 1/4 shorter than the head. Anal not quite so high as the second dorsal, and usually not separated from the caudal by a notch. Caudal rhomboidal. *Scales*—absent. *Colours*—pinkish, caudal darkest in its centre.

Tænioides Hermannii, Lacép. is said to be destitute of a caudal fin.

Habitat.—Seas of India to the Malay Archipelago and beyond. The specimen figured (from Calcutta) is nearly 15 inches long.

3. Gobioides cæculus, Plate LXVIII, fig. 1.

Cæpola cæcula, Bl. Schn. p. 241, t. 54.
Amblyopus cæculus, Cuv. and Val. xii, p. 165; Jerdon, M. J. L. and Sc. 1851, p. 144; Günther, Catal. iii, p. 133; Day, Fish. Malabar, p. 117.
Gogee ramah, Tel.

B. v, D. 6 | 40-44, P. 15, V. 1/5, A. 38-45, C. 13.

Length of head 7 to $7\frac{1}{4}$, of pectoral $16\frac{1}{2}$ to 18, of caudal 10, height of body $13\frac{1}{2}$ to 15 in the total length. *Eyes*—high up, minute, in the anterior third of the head, and 5 diameters from the end of the snout. The greatest width of the head equals its height or 1/2 its length. Body rounded, head as wide as the body. Lower jaw the longer, with some small barbels on it: cleft of mouth oblique. *Teeth*—an outer row of more or less curved teeth in either jaw, varying from 16 to 18 in the upper and 10 to 13 in the lower jaw, several villiform rows internally: no posterior canines in the lower jaw. *Fins*—dorsal and anal only united to the caudal at their bases in some specimens, in half the height of the last rays in others: the fins enveloped in skin. Ventral as long as the head. Caudal short and pointed. *Scales*—absent. *Colours*—vary, those at Madras are mostly of a leaden hue, becoming light on the abdomen (Schneider shows several vertical black bands which I have not observed): vertical fins gray, central caudal rays black: pectorals and ventrals reddish, or they may be of a coppery colour along the back, shot with blue along the sides, fins reddish except the caudal which is deep brown with reddish outer edges. Some are of a general reddish-brown colour.

Amongst Sir Walter Elliot's drawings of Waltair fishes is one of this species marked *Gagiliam* or *Ráma*, Tel. taken from a tank January 10th, 1854.

This fish, like many others related to it, is exceedingly vicious, and when captured snaps at everything near it: should its tail be touched it springs round and anything it seizes, it holds on to in the most determined manner.

Habitat.—Seas, estuaries, tidal rivers and tanks along the coasts of India and the Andamans. The one figured (life-size) is from Madras.

4. Gobioides cirratus, Plate LXIX, fig. 4.

Amblyopus cirratus, Blyth, J. A. S. of Beng. 1860, p. 147.
Amblyopus brachygaster, Günther, Catal. iii, 1861, p. 134.

B. v, D. 6 | 43-47, P. 13, V. 1/5, A. 43-46, C. 13.

Length of head $7\frac{1}{4}$, of caudal 9, height of body 8 to $12\frac{1}{2}$ in the total length. *Eyes*—exceedingly minute, sometimes almost invisible. Blyth says they are "undiscernible in an adult preserved in spirit." Günther says "eyes invisible." Greatest width of head equals 2/3 of its length, and its height equals slightly more. Lower jaw anterior, its end forming a portion of the dorsal profile: cleft of mouth almost vertical. A pair of barbels under the symphysis of the lower jaw, and two more along either ramus. *Teeth*—much larger and more curved than in *G. anguillaris*, from eight to ten in the upper and six or eight in the lower jaw: internal to this outer row are several more of pointed, scarcely villiform, teeth: no posterior canines above the symphysis of the lower jaw. *Fins*—dorsal densely enveloped in skin and not quite so high as the body, it is separated from the caudal by a notch. Pectoral fleshy in its basal three-fourths and not quite half as long as the ventrals, which latter are nearly as long as the head. Anal not quite so high as the dorsal and like it enveloped in dense skin and separated from the caudal by a deep notch. Caudal rhomboidal. *Colours*—bright pinkish, caudal dark except its outer edges which are pink.

A. brachygaster, Günther, appears to be the same. Length of head $6\frac{1}{4}$ to $6\frac{3}{4}$, of caudal 8, height of body $7\frac{1}{2}$ to 10* in the total length. Outer row of teeth in upper jaw from 19 to 20, in lower from 6 to 9. The adult specimen referred to is 10 not 14 inches in length.

Habitat.—Hooghly. The specimen figured is rather above 10 inches long, and from Calcutta. Its less numerous enlarged anterior row of teeth, comparatively shorter head and less height of body separate it from *G. anguillaris*, to which however it is very closely allied.

5. Gobioides Buchanani, Plate LXVII, fig. 5.

Amblyopus Buchanani, Day, Proc. Zool. Soc. 1873, p. 110.

B. v, D. 6 | 42, P. 19, V. 1/5, A. 36, C. 17.

Length of head 7 to $7\frac{1}{2}$, of caudal 8, height of body 12 to 14 in the total length. *Eyes*—distinct. Greatest width of head equals its height, or half its length. Lower jaw prominent, its cleft rather oblique. The posterior nostril opens just before the eye, and the anterior one, which is tubular, close to the front edge of the snout. A minute pair of barbels below the symphysis of the lower jaw, and a still smaller pair behind them. *Teeth*—a front row of eight large and curved teeth in either jaw, several villiform rows posterior to them: a pair of posterior canines above the symphysis of the lower jaw. *Fins*—vertical ones continuous, their posterior

* In Blyth's type the height of the body is 1/8 of the total.

portions scarcely enveloped in skin: caudal elongate and pointed. Pectoral not enveloped in skin, half as long as the ventrals and 2/7 of the length of the head. *Air-vessel*—large and oval. *Scales*—a few crypts containing some rudimentary ones exist in the posterior part of the body. *Colours*—brownish-olive superiorly, reddish inferiorly. Pectoral and ventral yellow, with their outer halves black. Vertical fins blackish.

An excellent coloured figure, 10 inches in length, marked *Amblyopus cœculus*, Nat. size, exists of this species amongst Sir W. Elliot's drawings of fish. It was captured at Waltair, September, 1852.

Habitat.—Calcutta, Lower Bengal, and along the coasts of the Bay of Bengal at least as low as Waltair, also Burma, certainly so far as Moulmein. The specimen figured is from Calcutta.

6. Gobioides rubicundus, Plate LXVII, fig. 6.

Ham. Buch. Fish. Ganges, pp. 37, 365, pl. 5, f. 9.
Amblyopus Mayenna, Cuv. and Val. xii, p. 163.
Amblyopus rubicunda, Swainson, Fishes, ii, p. 279.
Amblyopus anguillaris, Richards. Ich. China, p. 207.
Amblyopus Hermannianus, Günther, Catal. iii, p. 135.
Amblyopus tænia, Günther, Catal. iii, p. 135.
Odontamblyopus rubicundus, Bleeker, Gobioides, 1875, p. 42.

B. v, D. 6 | 35-39, P. 30, V. 1/5, A. 33-36, C. 15.

Length of head $7\frac{1}{2}$ to 8, of caudal 5 to 6, height of body 12 in the total length. *Eyes*—high up, in the front third of the head, almost concealed. Greatest width of head equals half its length, and its height equals its length behind the eyes. Cleft of mouth oblique, and of moderate depth. *Barbels*—absent.* *Teeth*—an outer row of about eight long, curved, pointed ones in the premaxillaries, and of about twelve similar ones in the lower jaw, posterior to these are one or two villiform rows in both jaws. A pair of posterior canines exist above the symphysis of the lower jaw. *Fins*—dorsal and anal fins not enveloped in skin, but both continuous with the caudal, the anal (as shown in the figure) is often only connected to the caudal by its base. The dorsal fin is about 1/2 the height of the body. Pectoral as long as the head behind the eyes, and the ventral nearly as long. Caudal lanceolate. *Scales*—in the form of crypts on the head, minute ones begin to appear on the body in its last half, and become more distinct near the tail. *Colours*—greenish-olive superiorly, becoming dull white below, vertical fins diaphanous: caudal black.

The proportions differ greatly with age. In one from Sind, $7\frac{1}{2}$ inches long, D. 6 | 33, the head is $9\frac{1}{2}$, caudal $3\frac{1}{3}$ in the total length.

Habitat.—Seas of India and estuaries, very common in the Hooghly at Calcutta, where it attains at least 11 inches in length. The specimen figured (life-size) is from Calcutta.

7. Gobioides tenuis, Plate LXIX, fig. 3.

? *Amblyopus roseus*, Cuv. and Val. xii, p. 164.

B. v, D. 6 | 33, P. 50, V. 1/5, A. 32, C. 17.

Length of head $8\frac{1}{3}$, of caudal $4\frac{1}{2}$, height of body $20\frac{1}{2}$ in the total length. *Eyes*—small but distinct in the anterior third of the head. Greatest width of head equals its height and nearly half its length. Body very compressed. Lower jaw the longer, but not so distinctly forming the front of the head as in the other species, the maxilla reaches to about 1 diameter behind the hind edge of the eye. Some small barbels below the symphysis of the lower jaw. *Teeth*—the outer row in the upper jaw consisting of about twelve curved canines not so large as those in the lower jaw, where there exists the same number: two or three rows of fine pointed teeth in either jaw behind the canines: and two posterior canines above the symphysis of the lower jaw. *Fins*—vertical ones not enveloped in skin, the dorsal continuous with the caudal, its height rather exceeds that of the body. Pectoral 2/3 as long as the head, with about 50 branched rays: ventral slightly longer. Caudal lanceolate. *Scales*—a few rudimentary ones present on the last part of the body. *Colours*—of a general roseate tinge, fins colourless except the caudal which is dark with a light outer edge.

The proportions of this fish, except as regards the pectoral fin, agree with *A. roseus*, C.V. which came from Bombay, it however is said to have D. 6 | 43, A. 1 | 41, and the pectoral $8\frac{1}{2}$ times in the total length.

Habitat.—Sind, where the specimen figured ($7\frac{1}{4}$ inches long) was captured.

Genus, 11—Trypauchen, *Cuv. and Val.*

Branchiostegals four: pseudobranchiæ. A deep blind cavity above the opercle, and which is not in communication with that of the branchiæ. Body elongated and compressed: head likewise compressed. Eyes lateral, minute, not elevated. Teeth in a band: no canines. Dorsal fin single, the anterior portion consisting of six spines, the soft with many rays, as has also the anal, whilst both are confluent with the caudal: ventrals with four or five rays, united forming a disk. Scales small, cycloid.

* In some young specimens from Madras I find rudimentary barbels.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Trypauchen vagina*, D. 6 | 48-49, A. 40-46. Pinkish. Coasts of India to the Malay Archipelago and China.

1. Trypauchen vagina, Plate LXVIII, fig. 2.

Gobius vagina, Bl. Schn. p. 73, No. 20.

Gobioides ruber, Ham. Buch. pp. 33, 365.

Trypauchen vagina, Cuv. and Val. xii, p. 153, pl. 351; Cantor, Catal. p. 190; Günther, Catal. iii, p. 137; Day, Fishes, Malabar, p. 118; Kner, Novara Fische, p. 187.

Na-vettee, Tam.

B. iv, D. 6 | 40-49, P. 15, V. 1/5, A. 40-46, C. 13, L. r. 80-85, L. tr. 21.

Length of head 1/7 to 1/8, of caudal 1/8, height of body 2/15 to 1/11 of the total length. *Eyes*—small, in the anterior fourth of the length of the head from the snout, and the same distance apart. Body elongated and compressed, occipital crest elevated. The greatest width of the head a little above 1/2 of its length, and its height equals its length behind the eyes. Lower jaw the longer, cleft of mouth oblique, the maxilla reaches to below the front edge of the eye. *Teeth*—an outer row of rather distantly placed, moderately long, conical and rather curved ones in either jaw, posterior to which is a fine row in the upper and two in the lower jaw. *Fins*—first dorsal spine rather wide at its base, the height of the fin is from 2 to $2\frac{1}{4}$ in that of the body: dorsal and anal confluent with the caudal. Pectoral 1/3 of the length of the head, its lower five rays short and unbranched: ventrals a little longer. Caudal pointed or rounded. *Scales*—cycloid, in rather irregular rows, lightest at their edges, sometimes depressed in their centres. *Colours*—white with a rosy tinge, much brighter at some seasons than at others: dorsal and anal with their outer edges gray: caudal, pectoral, and ventral white, or tinged with yellow.

Habitat.—Coasts of India through the Malay Archipelago to China. The specimen figured (from Calcutta) is $8\frac{3}{4}$ inches in length, and probably full grown. It is a very common fish, and eaten by the lower classes.

FAMILY, XXVIII—CALLIONYMIDÆ, *Richardson.*

Callionyminæ, Swainson.

Branchiostegals five to six: pseudobranchiæ. Gill-openings of moderate width or very narrow. Body mostly elongated. The infraorbital ring of bones does not articulate with the preopercle. Teeth in the jaws, none on the palate. Two dorsal fins, the anterior with from four to seven flexible spines: second dorsal and anal similar: ventrals wide asunder. Scales and lateral-line present or absent. Air-vessel absent.

In Cuv. and Val. these fishes are included under the *Gobioides*, but it is doubted if they should not form a separate Family, and Richardson, as I think, correctly considered them as such.

SYNOPSIS OF INDIVIDUAL GENUS.

1. *Callionymus.* Definition as in the family.

Genus, 1—CALLIONYMUS, *Linnæus.*

Synchiropus and *Diplogrammus*, Gill.

Branchiostegals five or six: pseudobranchiæ, a slit behind the fourth gill. Gill-openings very narrow, sometimes merely a round hole at the upper edge of the opercle. Head and anterior portion of the body depressed. Eyes of moderate size, usually directed somewhat upwards. Mouth narrow, upper jaw protractile. A strong, variously armed spine at the angle of the preopercle. Teeth in jaws minute: palate edentulous. Two dorsal fins, the anterior consisting of three or four flexible spines: ventrals with five rays, and widely separated one from the other. Lateral-line single or double. Air-vessel absent.

These fishes termed "Dragonets" appear to live mostly at the bottom of the sea and near the shore. They are extensively spread, being found in the temperate seas of the Old world, also throughout the seas of India to the Malay Archipelago and beyond. They exhibit in many instances sexual distinctions either in the length of their fins, in their colours, or in both. They have been divided in accordance with the size and position of their gill-openings as follows:—

1. Gill-opening small, superior. Lateral-line single.
2. Gill-opening small, superior. Lateral-line double.
3. Gill-opening lateral and more dilated. Lateral-line single.
4. Gill-opening lateral and more dilated. Lateral-line double.

SYNOPSIS OF SPECIES.

I. *Gill-opening small, superior. Lateral-line single.*

1. *Callionymus longicaudatus*, D. 4 | 9, A. 9. Preopercular spine with from 5 to 10 denticulations internally, and one at its base directed forwards. Dots on head and body, fins spotted. East coast of Africa, through seas of India to the Malay Archipelago.

2. *Callionymus sagitta*, D. 4 | 9, A. 9. Preopercular spine with four or five denticulations internally, and one at its base directed forwards. Maxilla does not reach to below orbit. Ocellated spots on body, first dorsal dark, other fins spotted. Seas of India and Mauritius.

3. *Callionymus fluviatilis*, D. 4 | 10, A. 9. Preopercular spine with two or three denticulations internally, and one at its base directed forwards. Maxilla reaches to below first third of eye. River Hooghly at Calcutta.

II. *Gill-opening more dilated and lateral. Lateral-line single.*

4. *Callionymus lineolatus*, D. 4 | 8, A. 7-8. Preopercular spine with two denticulations internally, and none at its base directed forwards. Bands across back: oval or round white spots on first dorsal fin: two or three rows of blue spots on the anal. Madras and Reunion.

5. *Callionymus Orientalis*, D. 4 | 10, A. 12. Preopercular spine with three denticulations internally. White spots on first dorsal fin, other fins banded. Tranquebar.

6. *Callionymus opercularis*, D. 4 | 9, A. 9. Interorbital space as wide as one diameter of the eye. Preopercular spine with six denticulations internally, and none directed forwards at its base. Brownish, dotted: fins spotted. Coromandel coast of India.

I. *Gill-opening small, superior. Lateral-line single.*

1. Callionymus longicaudatus.

Callionymus Japonicus, Houtt. Verh. Holl. Maats. Wet. Haarl. xx, p. 313; Gmel. Linn. p. 1155; Bl. Schn. p. 40; Richards. Ich. China, p. 210 (not Val.).

Callionymus longicaudatus, Temm. and Schleg. Fauna Japon. Poiss. p. 151, pl. 78, f. 1 and 2, and pl. 79 A, fig. 1; Bleeker, Japan. p. 17; Günther, Catal. iii, p. 148.

Callionymus Reevesii, Richards. Voy. Sulph. Fishes, p. 60, pl. 36, f. 1 and 3, and Ich. China, p. 210; Bleeker, Ceram. iii, p. 244, and Japan. p. 44.

Callionymus variegatus, Tem. and Schleg. l. c. p. 153 *(female)*.

Callionymus Belcheri, Richards. Voy. Sulph. p. 62, pl. 37, f. 1 and 2.

B. v, D. 4 | 9, P. 20, V. 5, A. 9, C. 10.

Length of head $4\frac{1}{3}$, of caudal 3, height of body 12 in the total length. *Eyes*—close together, diameter $4\frac{1}{2}$ in length of head, $1\frac{1}{3}$ diameters from end of snout. The greatest width of the head equals its length excluding the snout. The cleft of the mouth reaches to half way below the anterior edge of the eye. Preopercular spine straight, as long as the diameter of the eye, with from five to about ten denticulations internally, and one at its base pointing anteriorly. Gill-opening small, on the upper surface of the head. Numerous rows of warts on the head. *Teeth*—villiform in both jaws. *Lateral-line*—single. *Fins*—spines of the first dorsal, in the *male*, filiform, extending some distance beyond the membrane, and about twice as high as the body: caudal very elongate. In the *female*, the first dorsal spines are short, and the caudal of moderate length. Pectoral as long as the head excluding the snout, ventral longer. Caudal lanceolate. *Colours*—buff, with light rounded dots over the head and body, which occasionally have darker edges. First dorsal grayish, and four rows of spots along the second dorsal: caudal banded in spots. Anal with a black white-edged band externally. Ventrals grayish.

Richardson remarked, "I strongly suspect that Houttuyn's fish is identical with that which I have considered to be the female of *C. Reevesii*, though the caudal fin is longer than in Mr. Vachell's specimens, and shorter than that of the male figured in the Ichthyology of the Voyage of the Sulphur."

Bleeker observes that specimens from China have blackish spots on the second dorsal and pectoral *(C. Reevesii)*, which are wanting in those from Japan *(C. longicaudatus)*.

Günther states "some of the young specimens have the preopercular spine a little more coarsely denticulated and slightly bent outwards. These have been called by Sir J. Richardson *C. Belcheri*."

Habitat.—From the East coast of Africa, Andamans to the Malay Archipelago, China and beyond. It attains at least 13 inches in length.

2. Callionymus sagitta, Plate LXVIII, fig. 5 *(female)*.

Pall. Spic. viii, p. 29. t. 4, f. 4. 5; Cuv. and Val. xii, p. 301; Bleeker, Nat. Tyds. Ned. Ind. i, 1850, p. 31; Jerdon, M. J. L. and Sc. 1851. p. 143; Günther, Catal. iii, p. 146.

Callionymus serrato-spinosus, Gray and Hard. Ill. Indian Zool. *(female)*.

B. v, D. 4 | 9, P. 15, V. 1/5, A. 9, C. 12.

Length of head $3\frac{1}{3}$ to $3\frac{1}{2}$, of caudal $5\frac{1}{2}$, height of body 9 in the total length. *Eyes*—diameter 1/5 to 1/7 of length of head, 1 diameter from end of snout, and closely approximating superiorly. Head large, broad, and strongly depressed, its greatest width equalling its length excluding the snout: occiput rugose, as if pitted by thimble marks. The maxilla from $3\frac{1}{2}$ to 4 times in the length of the head, and scarcely reaches to below front edge of eye. Preopercular spine stout, as long as one diameter of the eye, and armed with four or five large curvedt eeth directed inwards and slightly upwards, whilst a fifth at its base is directed forwards, the females have the least number of teeth, sometimes only three inner ones are present, rarely above four. Gill-openings small, on the upper surface of the head. *Fins*—first dorsal with its anterior rays elongated (in the male) half as long as the body, but in the female rather low. *Lateral-line*—single. *Colours*—head and cheeks covered with small black dots surrounded by a white edge: back grayish, covered with small ocellated spots: sometimes six or eight black blotches along the middle of the sides, abdomen whitish. Dorsal fins of a light gray covered with ocelli, the first with a wide black edge in the female. Pectoral and ventral both spotted. Caudal with some black spots and whitish ocelli. Anal white in the male, with a black outer border.

Habitat.—Seas of India and Mauritius, the female specimen figured (life-size) is from Madras. It attains at least 4 inches in length.

3. Callionymus fluviatilis.

B. v, D. 4 | 10, P. 17, V. 1/5, A. 9, C. 11.

Length of head $3\frac{1}{2}$, of caudal $5\frac{1}{2}$, height of body 7 in the total length. *Eyes*—diameter 1/4 of length of head, 1 diameter from end of snout, and 1/4 of a diameter apart: the interorbital space rather concave. Head depressed, its greatest width equalling its length behind the eyes: occiput rugose. Maxilla nearly half as long as the head, and reaching to below the first third of the eye: lower jaw very narrow at its apex. Preopercular spine strong, as long as the orbit, and armed internally with two or three curved teeth and one more pointing

forward at its base. Gill-openings small, on the upper surface of the head. *Fins*—first dorsal low and of about equal height to the second, which equals about $1\frac{1}{2}$ diameters of the orbit. *Lateral-line*—single. *Colours*—grayish, upper portion of body gray ocellated with white, some brown spots along the upper surface of the lateral-line. First dorsal black, or only spotted, second with four or five rows of spots. Upper half of caudal spotted. Anal colourless.

This river and estuary species is allied to *C. sagitta*, whose female it closely resembles, but differs in its head not being so wide, having less denticulations to the preopercular spine internally, and its maxilla being very much longer. The male does not appear to have the rays of the first dorsal prolonged.

Habitat.—Hooghly at Calcutta to 3 inches in length.

II. *Gill-opening lateral and more dilated. Lateral-line single.*

4. Callionymus lineolatus, Plate LXVIII, fig. 3.

Cuv. and Val. xii. p. 307; Jerdon, M. J. L. and Sc., 1851, p. 142; Günther, Catal. iii, p. 149.
? *Callionymus lateralis*, Rich. Voy. Sulph. Fish. p. 65, pl. 37, f. 5 and 6.

B. v, D. 4/8, P. 15, V. 1/5, A. 7-8, C. 11.

Length of head $4\frac{1}{2}$ to 5, of ventral 4, of caudal $4\frac{1}{2}$, height of body 6 in the total length. *Eyes*—diameter 1/4 of length of head, nearly 1 diameter from end of snout, 1/3 of a diameter apart. Greatest width of head nearly equals its length. The maxilla reaches to below the anterior 1/3 of the orbit. Preopercular spine strong, equalling the diameter of the orbit in length, and having two teeth at the external third of its inner side, and none at its base directed forwards. Gill-openings are almost covered by the end of the opercle, which is not produced. *Teeth*—in minute rows in both jaws. *Fins*—first dorsal (in the *male*) high, from 1/3 to 2/5 of the total length, the anterior spine the longest, all being weak, in the *female* this fin is 1/3 less high than in the male: the anterior rays of the second dorsal shorter than the posterior ones, all of which are branched, the last to its base: anal of somewhat similar form, but shorter. *Scales*—absent. *Lateral-line*—single. *Colours*—five or six grayish bands cross the back, and are continued down the sides: one more crosses the head. Mouth and lower surface of head scarlet. Three or four irregular transverse white spots with dark edges, also some round ones over the upper half of the first dorsal fin, in the female usually only round spots on the first dorsal fin. Three oblique brown bands on the ventral and caudal. Anal red, with a dark edge, and having two or three blue, white- or black-edged spots behind each ray.

Habitat.—Madras and Reunion, to about 4 inches in length. The one figured (life-size) is from Madras.

5. Callionymus Orientalis.

Bl. Schn. p. 41, t. vi; Cuv. and Val. xii, p. 297.

D. 4 (3?) | 10, P. 4?, V. 7?, A. 12, C. 8?.

Preopercular spine short, having three teeth. *Fins*—the first ray of the first dorsal equals 1/2 the total length, and the second little shorter: second dorsal and anal nearly double the height of the body: pectoral about 1/4, and caudal more than 1/5 of the total length. *Colours*—orange, with black spots, and a few smaller white ones sparsely scattered amongst them. Dorsal and anal with round brown spots between their rays, also white points on the first of these fins: anal tinged with blackish, especially towards its margin: three brown or black bands across the pectoral, and five on the caudal: ventrals gray.

This species I have not obtained unless it is a male *C. lineolatus*, incorrectly described and figured.

Habitat.—Tranquebar, to 6 inches in length.

6. Callionymus opercularis.

Cuv. and Val. xii, p. 305; Günther, Catal. iii, p. 151.

B. v, D. 4 | 9, P. 19, V. 1/5, A. 9, C. 11.

Length of head $3\frac{1}{2}$ to 4, of caudal 5 to $5\frac{1}{2}$, height of body 6 in the total length. *Eyes*—diameter 1/5 of length of head, 1 to $1\frac{1}{2}$ diameters apart, and the same distance from the end of snout. Head wide and flat, its greatest width equalling its length excluding the snout: two stellated sets of smooth ridges on the occiput. The maxilla reaches to below the front edge of the eye. Preopercular spine strong, slightly curved, as long as the diameter of the eye, and having six teeth internally, none at its base pointing forwards. Gill-opening oval, covered by the produced extremity of the opercle. *Teeth*—pointed, in several rows, the largest of which is the inner one. *Fins*—dorsal fin not produced, half as high as the body, the second a little higher. *Lateral-line*—single, over the free portion of the tail the one on one side communicates with that on the other. *Colours*—brownish anteriorly, dotted with points of a slightly darker colour. First dorsal brown, rays of the second and those on the upper border of the pectoral and caudal fins have brown points on a pale ground colour. Lower surface of the body and the anal whitish or pale gray. Ventrals blackish.

Habitat.—Coromandel coast of India, attaining at least 4 inches in length, said to be very common in the Arian-coupan river at Pondicherry from November to January, but very rare during the remainder of the year. I have taken it both at Pondicherry and Madras.

FAMILY, XXIX—CEPOLIDÆ, *Bleeker.*

Tænioidei, pt. Cuv.

Branchiostegals six: pseudobranchiæ. Body elongated and compressed. Eyes large and lateral. The infraorbital bones do not articulate with the preopercle. Gill-openings wide, the membranes scarcely united under the throat. Teeth in jaws of medium size. A long dorsal and anal fin more or less continuous with the caudal. Ventral thoracic, with one spine and five rays. No prominent papilla near the vent. Scales cycloid, small. Pyloric appendages few.

Genus, 1—CEPOLA, *Linnæus.*

Acanthocepola, Bleeker.

Head obtuse. Cleft of mouth oblique, gape wide. Preopercle more or less armed. Palate edentulous.

Bleeker places those species with the head and opercles sealed, preopercles denticulated or spinate, and the body covered with imbricate scales, as a separate genus, *Acanthocepola.*

Geographical distribution.—Seas of Europe, through those of India, to China, and Japan.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Cepola abbreviata*, D. 67-74, A. 67-74. Length of head 6 to 7 in the total length. Red, with two rows of golden spots along the sides. Seas of India to China.

1. Cepola abbreviata, Plate LXVIII, fig. 4.

Cuv. and Val. x, p. 403; Cantor, Catal. p. 178; Bleeker, Sumatra, p. 38; Günther, Catal. iii. p. 488.
Cepola variegata, Swainson, Fishes, ii, p. 402.

B. vi, D. 67-74, P. 19, V. 1/5, A. 67-74, C. 13, Cæc. pyl. 8.

Length of head 6 to 7, height of body $10\frac{1}{2}$ in the total length. *Eyes*—diameter 1/3 of length of head, 2/3 of a diameter from end of snout, and 1/2 a diameter apart. Cleft of mouth oblique, the maxilla reaches to below the middle of the eye. Vertical limb of preopercle rather rugose, a strong spine at its angle, followed by four or five more along its lower limb. *Teeth*—in a single row in both jaws, those in the centre of the mandible rather the largest. *Fins*—the dorsal commences above the hind edge of the opercle, its rays, except the last two or three, are unbranched. The anal commences beneath the vertical from the eighth dorsal ray, it and the dorsal are continuous with the caudal. *Scales*—small but distinct: present on the cheeks and opercles. *Colours*—reddish, with about 12 pairs of red or golden spots along the sides. Caudal rays are said by Cantor to be black.

In Cuv. and Val. the formula of the fin rays from Mertens is given as follows:—D. 156, P. 18, V. 1/5, A. 76: Cantor gives, D. 72-74, P. 19, V. 1/5, A. 74, C. 13.

In Bl. Schneider, p. 242, a *Cepola striata* is mentioned from Tranquebar, but details are wanting to even show if it belongs to this family and not to *Gobiidæ.*

Habitat.—Coromandel coast of India, through the Malay Archipelago to China, attaining at least a foot in length. The specimen figured, a little less than the natural size, is from Dr. Jerdon's specimen referred to in the Madr. J. L. and Sc. 1851, p. 139, thus, "*Cepola*—I got one specimen only of a very pretty species of Pubben fish at Madras. It was red-silvered, and had two series of yellow spots on its sides." A coloured figure of it is present amongst Sir W. Elliot's drawings of Indian fishes, and is termed *Chawa aku* or *Chava waku.*

Family, XXX—BLENNIIDÆ, *Müller*.

Pseudobranchiæ present. Gill-openings of varying extent. Body elongated, more or less cylindrical. The infraorbital ring of bones does not articulate with the preopercle. Teeth may be fixed in the jaws, or merely implanted in the gums: a posterior canine may be present, whilst some genera have molars. One, two, or three dorsal fins, occupying nearly the entire length of the back, the spinous portion when distinct being less, nearly equally, or more developed than the soft: in some the whole fin is composed of spines, whilst in others none are perceptible. Ventrals, when present, jugular (except *Pseudoblennius*): they are sometimes rudimentary. Anal with a moderate or large number of rays. Caudal, when present, may be confluent with, or distinct from, the vertical fins. Scales, when present, generally small. Air-vessel as a rule absent. Pyloric appendages absent.

Geographical distribution.—The fishes forming this family are found along the shores of most regions, some extending their range into brackish or even, it is said, into fresh waters, (see note pp. 81 and 68, ante.). It is curious to observe how these small fishes may be unwillingly forced to emigrate to distant places. Thus a little Blenny was pumped up at sea (see page 326), it must have attached itself to the vessel before leaving harbour, or have been sucked up on some piece of floating substance on which it had drifted out to sea.

SYNOPSIS OF GENERA.

A. No molar teeth. Caudal fin distinct.

1. *Blennius.* Gill-opening wide. A single row of fixed teeth in the jaws, and occasionally a small posterior canine. Scaleless.
2. *Petroscirtes.* Gill-opening small. A single row of fixed teeth in the jaws, with a large lateral canine. Scaleless.
3. *Salarias.* Gill-opening wide. A single row of moveable teeth in the jaws, sometimes a posterior canine. Scaleless.
4. *Andamia.* Gill-opening wide. A single row of moveable teeth in the jaws, a sucker beneath the lower jaw. Scaleless.
5. *Tripterygium.* A band of villiform teeth in the jaws: palatine teeth. Three dorsal fins. Scaled.

B. No molar teeth. Caudal continuous with vertical fins.

6. *Xiphasia.* Fixed teeth in jaws, none on the palate. Body eel-shaped. Dorsal and anal many rayed.

Genus, 1—Blennius, *Artedi.*

Pholis, Cuv. and Val.

Branchiostegals six: pseudobranchiæ. Body somewhat elongated, with a short snout. Cleft of mouth narrow. Generally a tentacle above the orbit. Teeth in a single row fixed in the jaws: a posterior curved tooth usually present in one or both jaws. Dorsal fin single, the spinous portion being less or equally developed with the rayed: ventrals jugular, consisting of one spine and two rays: caudal distinct. Scales absent. Air-vessel and pyloric appendages absent.

Geographical distribution.—These fishes are fonnd on the coasts of Europe and Van Diemen's Land, also the Red Sea, seas of India to the Sandwich Islands.

SYNOPSIS OF SPECIES.

1. *Blennius leopardus*, D. 12 | 12, A. (2+)13. No crest on head. Brown, with black blotches and spots. Ceylon and Sandwich Islands.
2. *Blennius Steindachneri*, 11-12 | 15-16, A. (2+)16. No crest on head. Olive, with six vertical bands: a large black, white-edged, ocellus between the first and second dorsal ray. Seas of India.

1. Blennius leopardus, Plate LXVIII, fig. 6.

Salarias leopardus, Day, Proc. Zool. Soc. 1869, p. 518.

B. vi, D. 12 | 12, P. 15, V. 4, A. (2+) 13, C. 11.

Length of head 2/7, of pectoral 2/9, of caudal 2/9, height of body above 1/3 of the total length. *Eyes*—diameter 2/7 of length of head, $1\frac{1}{2}$ diameters from end of snout, and 1 apart. Snout obtuse, not overhanging the mouth. No crest on the head. A transverse row of tentacles across the occiput: a fringed supraorbital tentacle half the length of the eye: lips fringed, with two bifid tentacles on either side of the symphysis of the lower jaw. The maxilla extends to below the anterior margin of the orbit. *Fins*—a deep notch between the two portions of the dorsal fin: the second dorsal not continued quite to the caudal, which

last fin is cut square. Pectoral with the outer half of its eight lower rays free: two fleshy prominences anterior to the anal fin. *Colours*—a rich brown, becoming whitish on the chest, and blotched all over with black marks, leaving narrow interspaces of ground colour: fins spotted.

Habitat.—A specimen (figured life-sized) is in the Calcutta Museum, it was dredged off Galle harbour by Dr. J. Anderson.

Professor Peters showed me an equally fine one from the Sandwich Islands in the Berlin Museum.

2. Blennius Steindachneri, Plate LXX, fig. 1.

Day, Proc. Zool. Soc. 1873, p. 110.

B. vi, D. 11-12 | 15-16, P. 14, V. 3, A. (2+) 16-18, C. 11.

Length of head $4\frac{1}{2}$ to $4\frac{2}{3}$, of caudal 6 to $6\frac{1}{2}$, height of body $4\frac{1}{2}$ to $5\frac{1}{4}$ in the total length. *Eyes*—diameter $3\frac{1}{2}$ in length of head, 1 diameter from end of snout, and 1/2 a diameter apart. Snout obtuse, not overhanging the mouth. The maxilla reaches to below the first third of the eye. No crest on the head, but a line of eight or ten fringed tentacles from above the eye to the base of the dorsal fin: in some specimens the longest are $1\frac{1}{2}$ diameters of the orbit in height, usually they are less. A fringed orbital tentacle about half the length of the eye in extent, another at the nostril. *Teeth*—a small posterior canine in the lower jaw a little beyond the last tooth. *Fins*—first dorsal commences over the hind edge of the preopercle, it is 3/4 as high as the body and rather higher than the second, it is not distinctly notched, but the last spines are rather lower than the first rays, it is not continued on to the caudal. Pectoral nearly as long as the head, and almost twice as long as the ventral. Anal in some specimens has the first two rays expanded and fringed at their extremities into the form of rounded balls, in others these are absent. Caudal cut square. *Colours*—light olive, with six indistinct brownish bands, as wide as the ground colour, and extending to the base of the dorsal fin: the whole of the body and fins dotted with black, and occasionally with some white spots above the anal fin. A large black, white-edged ocellus, between the first and second dorsal rays. Some vertical red bands on the pectoral and caudal fins. Anal dark, with two rows of light blue spots on the anterior and three on the posterior rays, which have also small black dots and a narrow white edge. In some specimens all the dots are black.

Blennius semifasciatus, Rüpp. N. W. Fische, p. 134=*Salarias cyclops*, Rüpp. Atl. Fische, p. 113, t. 28, f. 3, appears closely allied to this species, but the dorsal fin is scarcely notched, the tentacles and colours likewise differ. Another allied species is *B. emarginatus*, Günther, which has the dorsal spot very distinct, but the fin is more deeply cleft.

Habitat.—Kurrachee, to 4 inches in length. They are common in pools left by the receding tides on the rocks of Oyster island. There are two illustrations of this species amongst Sir Walter Elliot's drawings, the largest was captured at Waltair, March 15th, 1853, the smaller one was pumped up on board the Samarang, April 6th, 1850, in the Bay of Bengal, Lat. 14′, 18 N. Long. 82·30 E.

Genus, 2—Petroscirtes, *Rüppell.*

Osmobranchus, Ehrenb.: *Blennechis*, Cuv. and Val.: *Aspidontus*, Quoy and Gaim.

Branchiostegals six: pseudobranchiæ. Gill-openings reduced to a small foramen above the root of the pectoral fin. Body somewhat elongated. Snout short or of moderate length: cleft of mouth narrow: head sometimes with tentacles. Teeth, a single row of fixed ones in the jaws, with laterally a strongly curved canine. Dorsal fin single or with a semi-detached portion: ventrals jugular, with two to four rays. No scales. Air-vessel present. Pyloric appendages absent.

Geographical distribution.—Coasts of the Red Sea, those of India to the Malay Archipelago and the Pacific.

SYNOPSIS OF SPECIES.

1. *Petroscirtes punctatus*, D. 34, A. 22-23. Head $6\frac{1}{3}$ in the total. Spots and four or five narrow horizontal lines on body. A dark band along the dorsal fin. India to Australia.
2. *Petroscirtes bipunctatus*, D. 33, A. 23. Head 5 in the total. Four blue lines on the head, two spots on dorsal fin. Calicut.
3. *Petroscirtes variabilis*, D. 28-31, A. 17-21. Head $5\frac{1}{4}$ in the total. A wide dark band from eye to caudal fin. Seas of India to the Malay Archipelago.
4. *Petroscirtes Lienardi*, D. 3 | 10 | 17, A. 18-20. Head $4\frac{1}{2}$ to $4\frac{3}{4}$ in the total. Vertically banded and spotted. Sind.
5. *Petroscirtes cyprinoides*, D. 30, A. 20. Head $4\frac{1}{4}$ in the total. Bands along the body, also spots. Seas of India to China.
6. *Petroscirtes breviceps*, D. 30, A. 19. Head $4\frac{1}{4}$ in the total. Black band along the head and side of body: dorsal dotted with black. Bay of Bengal.

1. Petroscirtes punctatus.

Blennechis punctatus, Cuv. and Val. xi, p. 286.
Omobranchus punctatus, Swainson, Fishes, ii, p. 274.
Petroscirtes punctatus, Günther, Catal. iii, p. 231.

B. vi, D. 34, P. 12, V. 2, A. 22-23, C. 12.

Length of head $6\frac{1}{3}$, of caudal 8, height of body 6 in the total length. *Eyes*—diameter $4\frac{1}{4}$ in length of head, 3/4 of a diameter from end of snout, and also apart. Greatest width of head equals half its length, and its height equals its length excluding the snout. Snout obtuse. The maxilla reaches to below the front third of the eye. *Teeth*—canines in the lower jaw large, their length equalling 3/4 of a diameter of the eye, those in the upper jaw only half their size. *Fins*—the dorsal fin just reaches to the base of the caudal, posteriorly it is 3/4 of the height of the body. Pectoral equals the length of the head excluding the snout. Ventral short, not above half as long as the pectoral. *Colours*—gray, with seven or eight pairs of spots on the body below the base of the dorsal fin: and four or five narrow, dark, horizontal lines along the body. A dark line along the dorsal fin becoming widest posteriorly. In small specimens, sometimes there appear to exist angular or irregularly directed narrow white bands.

Habitat.—Seas of India to Australia.

2. Petroscirtes bipunctatus, Plate LXXI, fig. 3.

B. vi, D. 33, P. 13, V. 2, A. 34, C. 16.

Length of head 5, of caudal $5\frac{1}{2}$, height of body $5\frac{1}{2}$ in the total length. *Eyes*—diameter $3\frac{1}{4}$ in length of head, nearly 1 diameter from end of snout, and 1 apart. Profile of snout obliquely rounded. Greatest width of head equals its length behind the middle of the eyes, and its height equals its length excluding the snout. The maxilla reaches to below the front third of the eye. No tentacles on the head. *Teeth*—24 in the upper and 22 in the lower jaw, laterally in the lower jaw is a large canine nearly equalling the diameter of the orbit, there is also a lateral canine on either side of the upper jaw about half the size of that in the lower. *Fins*—dorsal commences over the hind edge of the opercle, posteriorly it is not continued so far as the base of the caudal. *Colours*—brownish gray, with the upper surface of the anterior half of the head and also the snout blue, a narrow blue band descends from the middle of the eye, and on the throat joins one from the opposite side in a V-shape: a second from just behind the eye passes down parallel with the first and joins one from the opposite side, two more pass down from the opercle on to the base of the pectoral fin. Dorsal and anal fins edged with brown, two dark spots on the dorsal, the first from the fourth to the sixth ray, the second between the tenth and eleventh.

Habitat.—The specimen figured (life-size) is from the sea at Calicut.

3. Petroscirtes variabilis, Plate LXIX, fig. 7.

Cantor, Catal. p. 200; Günther, Catal. iii, p. 234.
? *Petroscirtes cynodon*, Peters, Wiegm. Arch. 1855, p. 246.

B. vi, D. 28-31, P. 13, V. 4, A. 17-21, C. 13.

Length of head $5\frac{1}{4}$, of caudal 6, height of body 6 in the total length. *Eyes*—diameter 1/4 of length of head, $1\frac{1}{4}$ diameters from end of snout, and also apart. Snout somewhat produced. Greatest width of head $2\frac{1}{4}$ in its length, and its height equals its length excluding the snout. Mouth transverse, the cleft only extends to beneath the anterior edge of the eye, but the maxilla reaches to below its first third. A short simple tentacle at the posterior-superior edge of the eye, and a very short one on either side of the chin. *Teeth*—the canine teeth in the lower jaw large, those in the upper small. *Fins*—dorsal commences behind the hind edge of the preopercle, it is not elevated anteriorly, its greatest height equals 3/4 of that of the body below it, it terminates a short distance before the root of the caudal fin. Pectoral and ventral each as long as the head without the snout, the latter fin having its two central rays of the same length and the longest in the fin. Caudal cut rather square, and said to sometimes have its upper or lower rays prolonged. *Colours*—pinkish, with dark spots, having a broad bluish or blackish band passing from the eye to the base of the caudal fin, where it ends in a large black blotch, in young specimens bands proceed a short distance upwards from it, and a row of light spots are seen along its lower border: a second dark band is sometimes present along the back at the base of the dorsal fin. Two or three blue bands pass downwards from the eye: head with numerous light spots. Dorsal fin marbled and spotted in lines, as is also the anal: caudal yellow, vertically banded in spots.

The specimens of *P. cynodon*, in the British Museum, received from Dr. Peters, have much more elongated fins than I have seen in *P. variabilis*, the head brown spotted and no orbital tentacle.

Habitat.—I have taken this species at Calicut on the Western coast of India, the one figured (life-size) was brought by the late Dr. Stoliczka from the Nicobars. It is found in the Malay Archipelago.

4. Petroscirtes Lienardi, Plate LXIX, fig. 8 ($\frac{2}{1}$).

B. vi, D. 3 | 10 | 17, P. 15, V. 3, A. 18-20, C. 11.

Length of head $4\frac{1}{2}$ to $4\frac{3}{4}$, of caudal 6 to $6\frac{1}{2}$, height of body $4\frac{1}{4}$ in the total length, *Eyes*—diameter 1/3 of length of head, not one diameter from end of snout, and 1/3 to 1/2 a diameter apart. Interorbital space concave. Greatest width of head equals half its length, and its height equals its length excluding the snout. Snout rather obtuse. The maxilla reaches to below the front edge of the eye. No crest on head. A short fringed supraorbital tentacle and a small one at the nostril: several below the symphysis of the lower jaw, and some on the cheeks and opercles. *Teeth*—25 in the lower jaw, with a very large canine laterally on either side, and 28 in the upper jaw having also a lateral canine, but much smaller. *Fins*—first three rays of the dorsal fin

separated by a deep cleft from the remainder,* they are 3/4 the height of the body; the next ten rays are much lower, projecting beyond the membrane and separated by a notch from the remaining 17 of the fin, which are about 3/4 the height of the body, and are not continued posteriorly on to the caudal. Pectoral as long as the head excluding the snout, ventral rather shorter. Caudal rounded. *Colours*—of a light brown stone colour, vertically banded and marbled with dark brown or gray. Dorsal fin light brown, marbled and spotted with darker, the upper two-thirds of the first portion nearly black, and some black marks near its base. Caudal yellow, with dark spots. Anal with oblique rows of spots and a dark outer edge. Two black spots at base of pectoral fin, which is yellow externally.

This species approaches *Blennéchis à dorsale élevée*, Lienard, from the Mauritius, which however has less rays and from 34 to 36 teeth in the upper, and 36 to 38 in the lower jaw. *Blennéchis marbré* of the same author, or *Petroskirtes marmoratus*, Bleeker, and *O. Thepassi*, Bleeker ?, though closely allied, has the body more elongated, its height being 8 in its length.

Habitat.—Sind, where they were found along with some Blennies, in pools left by a receding tide. The specimen figured (twice life-size) is from Kurrachee.

5. Petroscirtes cyprinoides.

Blennechis cyprinoides, Cuv. and Val. xi, p. 286.
Omobranchus cyprinoides, Swains. Fishes, ii, p. 274.
Petroscirtes cyprinoides, Günther, Catal. iii, p. 235.

B. vi, D. 30, P. 15, V. 3, A. 20, C. 11.

Length of head $4\frac{1}{4}$, of caudal $6\frac{3}{4}$, height of body $4\frac{1}{4}$ in the total length. *Eyes*—diameter 1/4 of length of head, 1 diameter from end of snout, and 1/4 of a diameter apart. Greatest width of the head equals its length behind the eyes, and its height is a little more. The maxilla reaches to below the front edge of the eye. Some irregularly-placed open pores on the head. *Teeth*—one or two large canines in the lower and one in the upper jaw. *Fins*—dorsal commences over the hind edge of the opercle and does not extend quite so far as the caudal. Pectoral as long as the head behind the middle of the eye. Ventral rather short. Caudal nearly cut square. *Colours*—a white band along the side, another below the base of the dorsal fin: a rather dark band along the base of the dorsal fin, and one or two rows of brown spots above it. A brown spot at base of pectoral fin: anal brownish with two or three rows of dark spots: caudal yellowish-white. Seven vertical bands are said to exist along the upper half of the back, extending on to the caudal fin.

Habitat.—Seas of India to China.

6. Petroscirtes breviceps.

Blennechis breviceps, Cuv. and Val. xi, p. 283.
Omobranchus breviceps, Swains. Fishes, ii, p. 274.
Petroscirtes breviceps, Günther, Catal. iii, p. 234.

B. vi, D. 30, P. 16, A. 19, C. 11.

Length of head $4\frac{1}{4}$, of caudal 8, height of body $5\frac{1}{2}$ ($4\frac{2}{3}$) in the total length. *Eyes*—diameter $3\frac{2}{3}$ in the length of head, 1 diameter from end of snout, and also apart. Greatest width of head equals 2/3 of its length: profile of snout oblique: interorbital space slightly concave. Cleft of mouth extends to below the first third of the eye. A small supraorbital tentacle present in the type specimen. *Teeth*—a very large canine on either side of the lower jaw, and a very much smaller one on each side of upper jaw. *Fins*—dorsal anteriorly 2/3 as high as the body, it commences above the gill-opening, posteriorly it reaches almost to the base of the caudal, the membrane is rather deeply emarginate. Pectoral equals the length of the head behind the middle of the eyes. *Colours*—a black band along the head and side of the body: dorsal fin dotted with black: caudal yellowish.

Habitat.—Bay of Bengal.

Genus, 3—Salarias, *Cuv.*

Alticus, Comm. . *Rupiscartes*, Swains. ; *Entomacrodus*, Gill.

Branchiostegals six: pseudobranchiæ. Gill-openings wide. Body somewhat elongated. Mouth transverse, rather wide: generally a tentacle above the orbit, especially in the males. Sometimes a crest upon the head. A row of small moveable teeth in the gums, and often a posterior curved canine in the lower jaw: palate almost invariably edentulous. Dorsal fin single: a notch exists in some species between the spinous and rayed portions: ventrals jugular, with one spine and two or three rays: fin rays simple, except those of the caudal, which are usually but not invariably branched. Scales absent. Air-vessel and pyloric appendages absent.

In some species the dorsal fin is more distinctly notched in the immature than in the mature. A crest on the head generally shows the specimen to be a male, and in these the dorsal fin is often comparatively higher than in the females. The presence or absence of an orbital tentacle has been considered a mark of sexual distinction.

* The separation of the three first rays appears to be subject to considerable modification, and is most distinct in the adults. The number of three may be reduced to a single one.

Some of these fishes have been constituted into a distinct Genus, *Alticus*, Com.=*Rupiscartes*, Swains. the differences between which and *Salarias* is thus characterized by Bleeker:—*Lateral-line absent. Body elongated, anteriorly wider than high. No tentacles at nostrils or nape. Ventral with four rays: caudal rays simple.* But *Salarias Andersonii*, is unquestionably an *Alticus*, with the lateral-line present. *Andamia* is an *Alticus*, possessing a sucker, whilst its nostril is a little tubular and prolonged. *Alticus*, as at present known, would consist of *S. Kirkii*, *S. tridactylus*, *S. monochrous*, *S. aspilus*, *S. Andersonii*, and *S. heteropterus*.

SYNOPSIS OF SPECIES.

A. *Dorsal fin not distinctly notched.*

1. *Salarias tridactylus*, D. 12-13 | 19-22, A. 25-26. Canines, when present, small. Crest on head. Simple supraorbital tentacle. Dorsal does not extend on to the caudal fin, the rays of which last are unbranched. Plumbaceous, dorsal with oblique streaks: anal with a dark outer edge. Red Sea, seas of India, to the Malay Archipelago.

2. *Salarias fuscus*, D. 30, A. 20. Canines absent. No crest on head. Supraorbital tentacle. Dorsal extends to base of caudal. Blackish. Red Sea to the Malay Archipelago.

3. *Salarias fasciatus*, D. 12 | 17-19, A. 19-21. Canines absent. No crest on head, short fringed supraorbital tentacle, one at nostril and a simple one at nape. Dorsal fin continued nearly to the caudal. Light brown, spotted and banded: light spots on throat. Red Sea, seas of India to the Malay Archipelago and beyond.

B. *Dorsal fin distinctly notched.*

4. *Salarias Kirkii*, D. 17 | 20-23, A. 28-29. Crest on head, a short fringed orbital tentacle. Dorsal fin not continued on to the caudal, which has simple undivided rays. Plumbaceous. Sind and Zanzibar.

5. *Salarias Andersonii*, D. 14 | 22, A. 28. No canines. A high crest on head. A short fringed orbital tentacle. Dorsal fin not continued on to the caudal, which has simple undivided rays. Plumbaceous: lower half of anal dark. Ceylon.

6. *Salarias quadricornis*, D. 13 | 20-22, A. 22-24. No canines. A well developed crest on the head. A long, simple, supraorbital tentacle, a fringed nasal, and a short one at the nape. Dorsal fin continued on to the caudal. Brownish, usually vertically banded, horizontal or oblique light lines on dorsal and anal fins. Red Sea, seas of India to the Malay Archipelago and beyond.

7. *Salarias lineatus*, D. 12 | 21-23, A. 23-24. No canines. A low crest on the head of the males. A fringed supraorbital tentacle, another at the nostril. Dorsal fin continued on to the caudal. Slate colour, with narrow dark lines along the body, and oblique ones on the dorsal fins. Red Sea, seas of India to the Malay Archipelago.

8. *Salarias Hasseltii*, D. 12 | 23, A. 24-25. No canines. A crest on head. A fringed supraorbital tentacle, another at nostril. Dorsal fin continuous with caudal. Vertical bands. Dorsal with oblique lines. Andamans, Malay Archipelago.

9. *Salarias Andamanensis*, D. 12 | 22, A. 22-24. Canines present. High crest on head. A supraorbital tentacle. Dorsal fin not continued on to the caudal. Ten brown bars, also two rows of dark-edged white spots along the body. Dorsal edged anteriorly with a dark white-margined band, posteriorly spotted. Caudal with six bands: anal with a dark outer edge. Andamans.

10. *Salarias Dussumieri*, D. 12 | 20-21, A. 22. No canines. A low crest on head of males. A fringed supraorbital tentacle, another at nostril. Dorsal continued on to the caudal. Brownish, vertically banded. Horizontal lines on first dorsal, oblique ones on the second, upper half of caudal spotted: lower part of anal dark. East coast of Africa, seas of India, to the Andamans.

11. *Salarias periophthalmus*, D. 12 | 20, A. 21. Canines present. A low crest on the head in some specimens. A simple supraorbital tentacle, a fringed nasal one. Dorsal fin not continued on to the caudal. Violet cross bands: blue spots on head, light blue spots edged above and below by black along the sides: several rows of spots along the dorsal fin: anal with a dark outer edge. Andamans to the Malay Archipelago.

12. *Salarias striolatus*, D. 12 | 20-21, A. 20-21. Small canines. A low crest on head in some specimens. A simple supraorbital tentacle, another at nostril. Dorsal fin not extended on to the caudal. Indistinct cross bands: five or six horizontal black lines along the body: dorsal with two rows of spots: anal with a row of blue spots along its base, and a dark outer edge. Five or six sinuous dark lines on each side of the caudal. Andamans.

13. *Salarias Bilitonensis*, D. 12 | 20, A. 20-21. Small canines. A high crest on the head. A long, simple, supraorbital tentacle, a short fringed nasal one. Dorsal fin extended on to the caudal. Bluish spots on head: about eight pairs of vertical streaks on the body, and sometimes longitudinal lines. Oblique brown marks on second dorsal: anal with a dark outer edge. Caudal with six or seven vertical bands. Andamans to the Malay Archipelago.

14. *Salarias unicolor*, D. 12 | 17-18, A. 18-19. No canines. A crest on the head in the male. A long fringed supraorbital tentacle, a short one at front nostril. Dorsal fin not continued on to the caudal. Brownish, with two or three rows of white or blue spots along the body: bands on fins. Red Sea, east coast of Africa, Sind.

15. *Salarias alboguttatus*, D. 12 | 18, A. 19-20. Small canines. Low crest on head. A fringed

supraorbital tentacle, one at nostril. Dorsal fin not continued on to the caudal. Blue spot on head, eight pairs of vertical brown bands, and two or three rows of white spots along the body. Oblique bands on dorsal fin. Andamans.

16. *Salarias frenatus*, D. 12 | 14-16, A. 18. Canines present. No crest on the head. A short fringed supraorbital tentacle, another at nostril, and a short simple one at nape. Dorsal continued on to the base of the caudal. Four white bands, edged with gray, go from eye to throat: body blotched, banded, and spotted. Oblique lines on dorsal fin. Malabar and Bombay.

17. *Salarias vermiculatus*, D. 12-13 | 15, A. 18-19. Large canines. No crest on head. A fringed supraorbital tentacle, a short nasal one, a short simple one at nape. Dorsal fin continued on to base of caudal. Vertically banded, reticulated brown lines on body and head. East coast of Africa, Andamans.

18. *Salarias marmoratus*, D. 12 | 15, A. 18. Large canines. No crest on head. A fringed supraorbital tentacle, one at nostril, and another at the nape. Dorsal fin does not extend on to the caudal. Brownish-yellow spotted, as are also the vertical fins. Ceylon and Sandwich islands.

A. *Dorsal fin not notched.*

1. Salarias tridactylus, Plate LXX, fig. 3.

Blennius tridactylus, Bl. Schn. p. 176.
Blennius amphibius, Walb. Artedi, iii, p. 187.
Blennius saliens, Lacép. ii, pp. 458, 479.
Salarias alticus, Cuv. and Val. xi, p. 337; Kner, Novara Fische, p. 196.
Rupiscartes alticus, Swainson, Fishes, ii, p. 275.
Blennius gobioides, Forst. Des. An. cur. Licht. p. 283.
Salarias tridactylus, Günther, Catal. iii, p. 242; Steind. Sitz. Ak. Wiss. Wien, 1868, p. 994; Klunz. Verh. z. b. Ges. Wien, 1871, p. 489.

B. vi, D. 12-13 | 19-22, P. 13, V. 1/3, A. 25-26, C. 11.

Length of head $6\frac{1}{4}$, of caudal $6\frac{1}{4}$, height of body $7\frac{1}{2}$ to $8\frac{1}{2}$ in the total length. *Eyes*—diameter 1/4 of length of head, 1 diameter from end of snout, and 1/4 of a diameter apart. Snout obtuse, overhanging the mouth. Height of the head equals its length excluding the snout, and its width equals its length behind the eyes. Cleft of mouth reaches to below the middle of the eye. A well developed crest on the head, a small and simple tentacle over the posterior-superior angle of the eye, none at nostril or neck. A row of four or five large open glands, having white edges round the posterior edge of the orbit. *Teeth*—in jaws small: canines are absent in my specimens, in Cuv. and Val. small ones are said to exist. *Fins*—dorsal not notched, as high as to double the height of the body, the spinous and rayed portion of nearly the same height, the membrane emarginate. the fin does not extend quite to the caudal, which latter is rounded. Pectoral as long as the head, ventral half as long. Caudal rays unbranched. *Colours*—plumbaceous, usually with vertical bands, fine black spots on the head and anterior portion of the body, and sometimes light spots exist on the body. Dorsal with oblique black streaks intervening with white ones, and a white outer edge. Caudal rays black with the membrane yellow. Anal with a gray base and a black white-edged outer margin.

Habitat.—Red Sea, seas of India to the Malay Archipelago.

2. Salarias fuscus, Plate LXX, fig. 2.

Rüppell, N. W. Fische, p. 135, t. 32, fig. 2; Günther, Catal. iii, p. 245; Klunz. Verh. z. b. Ges. Wien. 1871, p. 489.
Salarias ruficaudus, (Ehrenb.) Cuv. and Val. xi, p. 328.

B. vi, D. 30, P. 15, V. 2, A. 20, C. 11.

Length of head $4\frac{1}{2}$, of caudal 4 to $4\frac{1}{3}$, height of body $3\frac{1}{2}$ to 4 times in the total length. *Eyes*—high up, in the front half of the length of the head, not quite 1 diameter from end of snout, and two-thirds of a diameter apart. The profile from the eye to the snout subvertical, sometimes even projecting over the mouth. Height of head equals its length, and its width equals the length of its postorbital portion. The maxilla reaches to below the middle of the eye. A short simple tentacle over the eye. No crest on the head. *Teeth*—no posterior canine. *Fins*—dorsal fin not notched and continued on to the caudal, it is highest posteriorly, where however it does not quite equal the height of the body, in the specimen figured (male?) the last dorsal and anal rays are prolonged, the dorsal is continued posteriorly to the base of the caudal, which last is rather pointed. *Colours*—brown, with the dorsal and anal fins nearly black: pectoral yellow, with a black mark at its base: caudal brownish.

Salarias frontalis (Ehrenb.), Cuv. and Val. xi, p. 328, appears to be closely allied, but is said to possess long supraorbital tentacles.

Habitat.—From the Red Sea to the Malay Archipelago. The one figured (life-size) is from Kurrachee in Sind.

3. Salarias fasciatus.

Blennius gattorugine, Forsk. Desc. Anim. p. 23 (not Linn.).
Blennius fasciatus, Bloch, ii, p. 111, t. 162, f. 1; Bl. Schn. p. 168.

Salarias quadripinnis, Rüpp. Atl. Fische, p. 112, t. 28, f. 2; Cuv. and Val. xi, p. 318; Bleeker, Blenn. en Gob. p. 19.

Salarias fasciatus, Cuv. and Val. xi, p. 324; Günther, Catal. iii, p. 244; Peters, Monats. Akad. Berlin, 1868, p. 269; Klunz. Verh. z. b. Ges. Wien, 1871, p. 491.

Erpichthys fasciatus, Swainson, Fishes, ii, p. 275.

Salarias Priamensis, Bleeker, Sumatra, p. 268.

B. vi, D. 12 | 17-19, P. 17, V. 3, A. 19-21, C. 11.

Length of head 6 to $6\frac{1}{2}$, of caudal $5\frac{1}{2}$, height of body 5 in the total length. *Eyes*—diameter $4\frac{1}{2}$ in length of head, 1 diameter from end of snout, and 1 apart. Anterior profile of snout nearly vertical. The maxilla reaches to below the hind edge of the eye. No crest on the head. A short, fringed, supraorbital tentacle, a fringed nasal one, and one at the nape. *Teeth*—no canines. *Fins*—dorsal fin not notched, posteriorly it is continued nearly to the caudal. Front anal rays rather elongated and semi-detached. *Colours*—light brown banded and spotted with yellow and blue, sometimes blue spots along the base of the dorsal fin. On the throat and chest are light coloured bands and white spots.

Habitat.—From the Red Sea, through the seas of India to the Malay Archipelago and beyond.

B. *Dorsal fin distinctly notched.*

4. Salarias Kirkii, Plate LXIX, fig. 6.

Günther, Annals and Mag. Nat. Hist. 1868, p. 458.

B. vi, D. 17 | 20-23, P. 15, V. 4, A. 28-29, C. 14.

Length of head $6\frac{1}{2}$, of caudal 6, height of body $7\frac{1}{2}$ in the total length. *Eyes*—diameter 1/4 of length of the head, 1 diameter from end of snout, and 1/2 a diameter apart. Profile from upper edge of eyes to end of snout slightly oblique, some large open pores round the eyes. A moderately well developed crest on the head, a short fringed tentacle over the orbit. *Teeth*—no canines. *Fins*—dorsals divided by a slight notch: dorsal and caudal rays simple, not branched. Second dorsal is not continued posteriorly to quite so far as the base of the caudal. *Lateral-line*—visible. *Colours*—dark leaden, with some traces of vertical bands. Oblique lines on the dorsal fins. Lower edge of anal white.

S. kirkii, Günther, from Zanzibar, has D. 17 | 23, A. 29. This specimen from Sind has D. 17 | 20.

5. Salarias Andersonii.

B. vi, D. 14 | 22, P. 15, V. 4, A. 28, C. 14.

Length of head 7, of caudal $5\frac{1}{2}$, height of body 7 in the total length. *Eyes*—diameter $4\frac{1}{2}$ in length of head, 1 diameter from end of snout, and 1/3 of a diameter apart. Head rounded anteriorly, snout not projecting, its greatest width equals its height, or its length excluding the snout. The maxilla reaches to below the hind edge of the eye, some large open pores round the eyes, three anteriorly, and about five along its posterior edge. There are also some smaller ones about the head and nape. A rounded and high crest on the head equal to nearly 1/2 the height of the head. A short fringed tentacle over the orbit, none at the nape. *Teeth*—no canines. *Fins*—dorsals divided by a deep notch, which extends more than half-way down the ray, the ends of the spines and rays scarcely project beyond the membrane, the first dorsal anteriorly rather higher than the body, whilst the second dorsal is anteriorly three-fourths the height of the body and rather less posteriorly, it is not continued on to the caudal. Pectoral rather longer than the body is high. Anal not so high as the second dorsal. Caudal rays simple, not branched. *Lateral-line**—distinct, ceasing opposite the posterior end of the second dorsal fin. *Colours*—dark brownish, without bands. Dorsal fins dark, with a few spots near the posterior end of the second dorsal, upper edge of the fin white. Anal with a dark lower edge.

This species is allied to *S. tridactylus*, from which it differs, especially in having a deep cleft between the two dorsal fins.

Habitat.—There is a fine specimen of this species in the Calcutta Museum, it was brought from Galle by Dr. J. Anderson, after whom I have named it.

7. Salarias quadricornis, Plate LXX, fig. 4 (male).

Cuv. and Val. xi, p. 329, pl. 329; Jenyns, Voy. Beagle, Fishes, p. 87; Günther, Catal. iii, p. 255; Kner, Novara Fische, p. 197; Klunz, Verh. z. b. Ges. Wien, 1871, p. 489.

Salarias rivulatus, Rüpp. Atl. Fische, p. 114; Günther, Catal. iii, p. 244.

Erpichthys quadricornis, Swainson, Fishes, ii, p. 275.

B. vi, D. 13 | 20-22, P. 14, V. 2, A. 22-24, C. 13.

Length of head $5\frac{1}{2}$ to 6, of caudal 6 to $6\frac{1}{4}$, height of body $5\frac{1}{2}$ to 6 in the total length. *Eyes*—high up, about 1 diameter from end of snout, 1/2 a diameter apart: the profile before the eyes is nearly vertical: interorbital space concave. Height of head equals its length excluding the snout, and its width equals its postorbital length. The maxilla reaches to below the hind edge of the eye. The male has a low crest on the

* I allude to the lateral-line here, because it is said to be absent in the species of *Alticus*, to which this fish would unquestionably otherwise belong.

2 U 2

head which is said to be wanting in the female. A simple tentacle above the eye as long as one diameter of the orbit: a fringed one at nostril, and a small one on the nape. *Teeth*—no canines. *Fins*—first dorsal fin about half the height of the body, but not quite so high as the second: a deep cleft in the membrane extending nearly to the base divides the two fins, the second is continued on to the caudal to 1/3 its length. Anal lower than the dorsal, its membrane deeply cleft. Caudal slightly rounded. *Colours*—vary exceedingly, body usually brownish, with eight or more vertical bands which reach to the base of the dorsal fin, sometimes there are brown dots. Dorsal fin with horizontal or oblique white bands, usually about four in number. Anal with two or three horizontal white bands.

Klunzinger considers *S. oryx* a variety of this species, and he distinguishes several others, dividing them into *S. hyalinus*, *S. coloratus*, *S. transiens*, and *S. unitus*. *S. bellus*, Günther, is very closely allied to this fish.

Habitat.—Red Sea, seas of India, to the Malay Archipelago and China. It attains several inches in length. The one figured (life-size) is from the Andamans.

7. Salarias lineatus, Plate LXX, fig. 8, (male).

Cuv. and Val. xi, p. 314; Bleeker, Blen. en Gob. p. 18; Günther, Catal. iii, p. 254; Steind. Sitz. Ak. Wiss. Wien, 1868, p. 996.

B. vi, D. 12 | 21-23, P. 14, V. 2, A. 23-24, C. 13.

Length of head $5\frac{3}{4}$ to $6\frac{1}{4}$, of caudal $6\frac{1}{2}$, height of body $6\frac{1}{2}$ to $6\frac{3}{4}$ in the total length. *Eyes*—high up, in the anterior third of the head, 2/3 of a diameter apart: the profile from them to the snout subvertical. Height of head equals its length excluding the snout, and its width equals its postorbital length. A tentacle with notched edges, or fine lateral fringes, and about half the height of the eye is present above the orbit, and a short fringed one at the front nostril. A rather low crest, emarginate superiorly, exists on the summit of the head in the male, it is absent in the female. *Teeth*—canines absent. *Fins*—dorsal membrane deeply cleft after the twelfth spine, the first fin two-thirds of the height of the body, the second rather higher and continued on to the caudal. Pectoral as long as the head excluding the snout. *Colours*—leaden, in some specimens six or eight vertical bands on the body as wide as the ground colour, eight to ten narrow horizontal black lines pass along the body, decreasing in number to four or five, and becoming more distinct towards the tail, sometimes they break up into spots, some have narrow black vertical and sinuous lines on the cheek and below the eyes. Dorsal fins with numerous fine and oblique black lines, passing upwards and backwards. Anal with a lightish base and dark outer edge, in some specimens a narrow dark band exists along its middle. Caudal dark grayish.

Habitat.—Red Sea, seas of India to the Malay Archipelago. The specimen figured (life-size) is from the Andamans. I have received two specimens from Berlin, which came from the Red Sea.

8. Salarias Hasseltii.

Bleeker, Nat. Tyds. Ned. Ind. i, p. 257, f. 14, and viii, p. 174; Günther, Catal. iii, p. 258.

B. vi, D. 12 | 23, P. 14, V. 3, A. 24-25, C. 14.

Length of head $5\frac{3}{4}$, of caudal $6\frac{1}{2}$, height of body $7\frac{1}{4}$ in the total length. *Eyes*—of moderate size, the profile from them to the mouth vertical, but not prominent. The width of the head equals its length behind the eyes, and its height nearly equals its length excluding the snout. The maxilla reaches to below the hind edge of the eye. A line of open glands along the hind and lower edge of the preopercle. A crest on the head (? only in males): a short fringed supraorbital tentacle, another at the nostril, none at the nape. *Teeth*—no canines. *Fins*—dorsal deeply notched, and continuous posteriorly at its base with the caudal, the two fins are of nearly the same height and about equal to that of the body. *Colours*—stone-colour, with about six rather darker vertical cross bands and several light longitudinal stripes. Dorsal brownish, with oblique stripes in its lower half, whilst its upper portion has four or five narrow bands parallel with its outer edge, and of a blue-brown and yellow colour. Anal with a dark outer edge.

Habitat.—I obtained one specimen, 3 inches long, at the Andamans. It extends to the Malay Archipelago and Fiji islands.

9. Salarias Andamanensis.

Day, Proc. Zool. Soc. 1869, p. 611.

B. vi, D. 12 | 22, P. 15, V. 4, A. 22-24, C. 11.

Length of head 1/6, of pectoral 1/7, of caudal 2/11, height of body 1/5, of dorsal spines 2/17, of dorsal rays 2/17, of anal 1/11 of the total length. *Eyes*—diameter 1/3 of length of head. The profile from the eyes to the snout vertical: the maxilla extends to beneath the posterior margin of the orbit. A rather high crest on the head. Supraorbital tentacle two-thirds as long as the eye. *Teeth*—a pair of large posterior canines in the lower jaw. *Fins*—a rather deep notch between the two divisions of the dorsal fin. The posterior extremity of the dorsal does not extend to the caudal. Caudal with central rays the longest. *Colours*—brownish, with ten brown bars along the centre of the body: a row of pearly-coloured oblong spots with dark margins above the centre of the body in its posterior half, and a similar row along its lower half. Dorsal fin with a dark margin edged with white, and the posterior portion of the second dorsal spotted. Anal edged

with black. Pectoral and ventral white: caudal barred in about six lines on either side of fin: head darkish anteriorly.

Habitat.—Andamans, from whence two specimens up to 4 inches in length were brought by Dr. J. Anderson, and presented to the Calcutta Museum. Another specimen, 3 inches in length, was brought from the same locality and presented by Captain Hodges, who likewise gave what appears to be the same species ($1\frac{7}{10}$ inches long) but wanting both crest and orbital tentacle.

10. Salarias Dussumieri, Plate LXX, fig. 7.

Cuv. and Val. xi, p. 310; Jerdon, M. J. L. and Sc. 1851, p. 144; Günther, Catal. iii, p. 251; Playfair, Fish. Zanz. p. 77, pl. ix, f. 6, 7.

? *Salarias striato-maculatus*, Kner and Steind. Sitz. Ak. Wiss. Wien, 1866, liv, p. 368, f. 4.

B. vi, D. 12 | 20-21, P. 14, V. 3, A. 22, C. 11.

Length of head $5\frac{1}{2}$, of pectoral 6, of caudal 7, height of body 5 to 6 in the total length. *Eyes*—diameter 1/4 of length of head, 1 diameter from end of snout, and 3/4 of a diameter apart. Snout not overhanging the mouth, but the profile subvertical. A low crest on the head in the males, none in the females: a fringed tentacle above the orbit, and another short one at the front nostril: none on the nape. The maxilla reaches to below the hind edge of the eye. *Teeth*—canines absent. *Fins*—first dorsal half as high as the body, but not quite equalling the second dorsal, they are separated by a deep notch, the second dorsal is continued posteriorly on to the caudal fin, which latter is rounded, the central rays being the longest. Lower fourth of anal rays free. *Colours*—brownish, body more or less vertically banded, or with pairs of narrow bands. Three or four horizontal bands or rows of spots along the first dorsal fin, and numerous oblique ones passing upwards and backwards on the second, these lines are often broken up into spots. Upper half of caudal banded in spots. Anal grayish, with a black outer edge.*

Playfair, *l. c.* states "adult males, three and a half inches long, want the orbital tentacle," an observation I have been unable to confirm. Markings likewise are not peculiar to the sexes.

Habitat.—East coast of Africa, seas of India to the Andaman islands. The specimen figured (life-size) is from the Andamans.

11. Salarias periophthalmus, Plate LXIX, fig. 5.

Cuv. and Val. xi, p. 311, pl. 328; Bleeker, Sumatra, ii, p. 267; Günther, Catal. iii, p. 251; Peters, Monats. Akad. Berlin, 1868, p. 269.

B. vi, D. 12 | 20, P. 15, V. 2. A. 21, C. 15.

Length of head $5\frac{1}{2}$, of pectoral $6\frac{1}{2}$, of caudal 5, height of body 7 in the total length. *Eyes*—high up, diameter 1/3 of length of head, 1 diameter from end of snout, and 1/2 a diameter apart. The profile from the eyes to snout vertical, but scarcely projecting beyond the mouth. Height of the head equals its length excluding the snout, and its width is rather above half its length. The maxilla reaches to below the hind edge of the eye. A simple tentacle about half the length of the eye above the orbit, and a fringed one at the nostril. A low crest on the head in some specimens, absent in others. *Teeth*—posterior canines in the lower jaw. *Fins*—first dorsal lower than the second, which is 2/7 the height of the body, whilst at the division the notch almost reaches the base of the fin. Dorsal fin not continued on to the caudal, which is rounded. *Colours*—rose-coloured, with violet cross bands. An oblique blue band under the eye, a small spot on the cheek, and a large one on the opercle. Two rows of blue spots, margined above and below by black, exist along the sides. Dorsal fin white, with five or six rows of spots: anal orange, with a gray or black outer edge. Caudal yellow, with small red spots.

The specimens, with crests, so exactly resemble those without, in colour, shape, and number of fin rays, whilst they are captured together, that it can scarcely be doubted but that they belong to the same species.

Habitat.—Andamans to the Malay Archipelago. The specimen figured (life-size) is from Port Blair.

12. Salarias striolatus.

B. vi, D. 12 | 20-21, P. 14, V. 2, A. 20-21, C. 13.

Length of head $5\frac{1}{4}$, of caudal 8, height of body $5\frac{1}{2}$ in the total length. *Eyes*—comparatively large and high up, the profile from the eyes to the snout vertical, overhanging the mouth. Height of head equals its length behind the eyes, and its width equals half its length. The maxilla reaches to below the last third of the eye. A very low crest on the head, absent in some (? female) specimens. A simple supraorbital tentacle as long as the eye, also a simple nasal one, none at the nape. *Teeth*—small posterior canines in the lower jaw. *Fins*—the dorsal fin deeply notched, and not extended on to the caudal, first portion very low, the second higher equalling half that of the body. Caudal rounded. *Colours*—grayish, with indistinct vertical cross bands. A blue spot below the eye. Five or six horizontal black lines commence opposite the end of the pectoral fin, which on arriving near the caudal break up into spots. Dorsal fins with two horizontal rows of spots, which

* There are some specimens in the Calcutta Museum entirely agreeing with the description of this fish, except that they have a low crest on the head. They are rather more decidedly vertically banded than the other specimens. I obtained one at the Andamans, found it was a male, and I consider of this species.

are smaller but most distinct on the second dorsal. Anal with a row of blue spots along its base, and a gray external edge. Five or six vertical and sinuous bands of spots on the caudal. In some specimens, more especially in those wanting the crest on the head, the bands along the body are not well marked.

This fish not only differs in the number of fin rays from *S. lineatus*, but also in possessing canine teeth. The marks on its dorsal fin are horizontal instead of being oblique. There are several specimens in the Calcutta Museum.

Habitat.—Andamans.

13. Salarias Bilitonensis, Plate LXXI, fig. 1.

Bleeker, Biliton, iv, p. 231; Günther, Catal. iii, p. 257.

B. vi, D. 12 | 20, P. 13, V. 2, A. 20-21, C. 15.

Length of head $5\frac{3}{4}$, of caudal 6, height of body 7 to 8 times in the total length. *Eyes*—in the anterior third of the head, the interorbital space concave, with a slight ridge along its centre, profile from eyes to snout prominent, but not overhanging the jaws. The greatest width of the head eqnals rather above half its length, and its height equals its length behind the eyes. The maxilla reaches to below the hind edge of the eyes. A rather large rounded crest on the head. A simple supraorbital tentacle as long as the eye, a short fringed one at the nostril, none at the nape. *Teeth*—a pair of rather small canines in the lower jaw. *Fins*—a deep notch between the two dorsal fins, posteriorly it is continued on to the base of the caudal fin: first dorsal two-thirds as high as the body, the second posteriorly as high as the body. Lower pectoral fin rays longer than the upper ones. Anal as high as the first dorsal. *Colours*—greenish stone-coloured, with some bluish spots on the head near the eyes, about eight pairs of vertical streaks on the body, and sometimes eight or ten longitudinal dark ones. Dorsal more or less marked with brown, which in places forms spots: oblique brown marks on lower half of the second dorsal, and a dark outer edge. Anal with a dark outer edge. Caudal dark, with six or seven narrow vertical bands.

Habitat.—Andamans to the Malay Archipelago.

14. Salarias unicolor, Plate LXX, fig. 6 *male*, 5 *female*.

Ruppell, N.W. Fische, p. 136; Günther, Catal. iii, p. 259; Playfair, Fish. Zanz. p. 77; Klunz. Verh. z. b. Ges. in Wien, 1871, p. 488; Day, Proc. Zool. Soc. 1873, p. 110.

B. vi, D. 12 | 17-18, P. 14, V. 2, A. 18-19, C. 10.

Length of head 5 to $5\frac{1}{2}$, of caudal 6 to 7, height of body 5 to $5\frac{1}{2}$ in the total length. *Eyes*—rather prominent, $1\frac{1}{2}$ to 2 diameters from end of snout, 1/2 a diameter apart. Interorbital space slightly concave. The height of the head equals its length excluding the snout, its width is rather less. The forehead does not project beyond the mouth. In *the male* a well developed crest on the occiput, and a fringed tentacle twice as long as the eye above the orbit: another short one at the anterior nostril. In *the female* no crest on the neck, a fringed tentacle about as long as the eye above the orbit, and another short one at the anterior nostril. *Teeth*—no canines. *Fins*—a deep notch between the two portions of the dorsal fin, the anterior being much lower than the posterior; the fin not continuous with the caudal, which last is cut nearly square. All the fin rays simple, except those of the caudal. *Colours*—in the *male* olive brown, with distinct blackish blotches along the side and extended on to the dorsal fin: two or three rows of blue spots on the body and head. The *female* olive brown, becoming white beneath, and marbled all over with brown lines forming large insulated spaces. Head and upper two-thirds of the body dotted with light blue: fins yellowish: dorsal and anal, horizontally and sinuously banded in spots: caudal with five or six vertieal dark bands. A brown band, divided by a light blue line, at the base of the pectoral, which is yellowish barred with brown.

Habitat.—Red Sea, East coast of Africa, and Kurrachee, from which latter place the specimens figured (life-size) were procured.

15. Salarias alboguttatus.

? Salarias textilis (Quoy and Gaim.) Cuv. and Val. xi, p. 307.

B. vi, D. 12 | 18, P. 15, V. 1/2, A. 19-20, C. 13.

Length of head 6, of caudal 7, height of body $5\frac{1}{3}$ in the total length. *Eyes*—high up, the profile to the snout slightly oblique, not overhanging the jaws. Greatest width of head equals its length behind the eyes, and its width equals its length excluding the snout. A low crest on the head; a fringed tentacle half as high as the eye above the orbit, a similar one at nostril, but none at the nape. Maxilla reaches to below hind edge of eye. *Teeth*—a small posterior canine in the lower jaw. *Fins*—the first dorsal slightly lower than the second, the two being divided by a deep notch, the second, which is two-thirds the height of the body, is not continued to so far as the base of the caudal fin, which is rounded. *Colours*—light brown, with eight pairs of well marked vertical bands as wide as the ground colour. An oval blue spot behind the eye. Many small round ones with a dark edge on the head: two rather large brown ones at the base of the pectoral fin, which is brownish. Two or three rows of white spots in the lower and posterior half of the body. First dorsal brown, with some oblique brown bands: second dorsal white, with some oblique dark bands. A dark spot at base of caudal, which is banded with brown spots. Anal light-coloured, with a dark outer edge, which has a narrow light margin.

This fish appears to be close to *S. textilis*, C. V., from the island of Ascension, which however is said to have D. 12 | 15, A. 16, a tentacle at the nape, and large canines in the lower jaw.
Habitat.—Andamans, up to $2\frac{1}{2}$ inches in length.

16. Salarias frenatus, Plate LXX, fig. 9.

Cuv. and Val. xi, p. 342; Günther, Catal. iii, p. 246.
Erpichthys frenatus, Swainson, Fishes, ii, p. 275.

B. vi, D. 12 | 14-16, P. 14, V. 1/2, A. 18, C. 13.

Length of head 5, of caudal 6, height of body $6\frac{1}{2}$ to 7 in the total length. *Eyes*—high up, rather above 1 diameter from end of snout, the anterior profile very oblique. Height of head equals its length behind the middle of the eyes, and its width equals its postorbital length. No crest on the head. A short fringed tentacle above the orbit, another at the nostril, and a simple one on the nape. *Teeth*—posterior canines in the lower jaw. *Fins*—first dorsal lower than the second, separated by a well-marked notch. Second dorsal two-thirds the height of the body, and continued on to the base of the caudal. *Colour*—fawn-colour, becoming nearly white on the abdomen, four white lines edged with gray go from the eye to the throat, and one or two likewise pass from one eye to the other. Body with vertical bands, and irregularly blotched and spotted with darker. Dorsal fins with oblique dark lines: caudal with vertical bands of spots: anal whitish, with a dark outer edge. Upper half of pectoral light-coloured, its lower half dark.
Habitat.—Malabar and Bombay. The specimen figured (life-size) is one of the original types. For it I am indebted to the kindness of the officials of the Jardin des Plantes at Paris.

17. Salarias vermiculatus.

Cuv. and Val. xi, p. 301; Günther, Catal. iii, p. 249.

B. vi, D. 12-13 | 15, P. 14, V. 2, A. 18-19, C. 11.

Length of head 5 to $5\frac{1}{2}$, of pectoral $5\frac{1}{2}$, of caudal 6, height of body 5 to $5\frac{1}{2}$ in the total length. *Eyes*—high up, diameter 1/4 of length of head, $1\frac{1}{4}$ diameters from end of snout, and 3/4 of a diameter apart. Snout not overhanging the mouth. The maxilla reaches to below the middle of the orbit. No crest on head. A moderately long fringed tentacle over the orbit, a small fringed one over the anterior nostril, and a fine occipital one: upper lip fringed. *Teeth*—large canines in the lower jaw. *Fins*—a deep notch between the first and second dorsal, the latter of which is continuous with the base of the caudal: first dorsal lower than the second, which latter is highest posteriorly, the lower six or eight rays of the pectoral having free extremities, while the upper five are very short. Anal a little in advance of the second dorsal, with the anterior 13 rays having free extremities, where the interspinous membrane is deeply notched: caudal cut square. *Colours*—superiorly brownish, becoming bluish-white inferiorly, with a series of nine brown bars descending to the lateral-line. The body, head, and fins reticulated with brown lines, enclosing circular or irregularly formed spaces.
Habitat.—East coast of Africa, Andamans: there are some fine specimens in the Calcutta Museum. It attains at least 8 inches in length.

18. Salarias marmoratus.

Blennius marmoratus, Bennett. P. Z. S. iv, p. 35.
Salarias marmoratus, Cuv. and Val. xi, p. 305; Günther, Catal. iii, pp. 248, 362.

B. vi, D. 12 | 15, P. 14, V. 3, A. 18, C. 11.

Length of head $4\frac{3}{4}$, of caudal $7\frac{1}{2}$, height of body $5\frac{1}{2}$ in the total length. *Eyes*—high up, rather above 1 diameter from end of snout: the anterior profile very oblique. Height of head equals its length excluding the snout, and its width equals its postorbital length. No crest on the head. A fringed supraorbital tentacle as long as the diameter of the eye, another short one at the nostril, and having some filaments at its base: whilst one also fringed exists at the nape. *Teeth*—a strong posterior canine in the lower jaw. *Fins*—dorsal fin deeply notched, the first lower than the second, which is nearly 1/2 the height of the body, whilst posteriorly it does not extend on to the caudal, the interspace (*from the base of the last ray*) being equal to one-tenth of the length of the base of the dorsal fin. *Colours*—brownish-yellow, with cloudy spots of a blackish-brown colour, which are in two series, and on the brown are yellow spots. Fins, except the ventral, spotted with yellow.
Habitat.—Ceylon and Sandwich islands. It attains to 4 inches in length.

Genus, 4—Andamia, *Blyth.*

Differs from Salarias in possessing an adhesive sucker behind and below the symphysis of the mandibles. Caudal rays unbranched.

Blyth most correctly observes that the fish which constitutes this genus has broad expanded pectorals thrown out, as in the cyprinoid genus *Homaloptera.*

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Andamia expansa*, D. $\frac{16}{18}$, A, 25-26. Olive, banded with darker. Andamans and Nicobars to the Malay Archipelago.

1. Andamia expansa, Plate LXXI, fig. 2.

Andamia expansa, Blyth, J. A. S. of Beng. 1858, p. 270; Günther, Catal. iii, p. 294; Day, Proc. Zool. Soc. 1869, p. 518.

Salarias æquipinnis, Günther, Catal. iii, p. 253.

B. vi, D. 16 | 18, P. 14-15, V. 3, A. 25-26, C. 14.

Length of head $6\frac{1}{2}$ to 7, of pectoral $6\frac{1}{2}$, of caudal $5\frac{1}{4}$ to $5\frac{1}{2}$, height of body 8 to 9 in the total length. Breadth of head equals its length. *Eyes*—elevated, diameter 1/4 of length of head, 1 to $1\frac{1}{4}$ diameters from end of snout, and 1 apart. Body sub-cylindrical, compressed. Head compressed: snout rounded anteriorly: a short tentacle over the posterior third of the orbit, which divides into several. A small simple extension forming a sort of tentacle at both nostrils: lips thick, the upper being continuous with the lower one, which below the symphysis of the mandible forms a broad adhesive sucker. *Gill-openings*—wide, extending on to the lower surface of the head. *Teeth*—in a fine single row implanted in the gums of both jaws: no canines. *Fins*—dorsal fin not notched, it commences a short distance behind the occiput. The spines are free to a greater or less extent, in some the second is the longest. The soft dorsal about equals in height the posterior part of the first dorsal. In some specimens the two dorsal fins are continuous, and in others the second dorsal is higher than the first, but it never appears to exceed the height of the body: anal lower than the dorsal, all its rays free in their lower halves. Pectoral with its outer half horizontal, and its inner vertical, its rays are free at their extremities: caudal with rays undivided and free at their extremities. *Colours*—olive, banded with a darker shade: head spotted. Fins with dark edges, except the anal, which has a white margin.

Habitat.—Andamans and Nicobars to Amboina. It attains 3 or 4 inches in length. The one figured (life-size) is from the Andamans. It appears to be nearly related to *Salarias* or *Alticus heteropterus*, Bleeker, which however is said to have D. 14 | 21, A. 26-27, and no mention is made of the labial sucker. There are specimens from Amboina both in the British and Berlin Museums. Some of those in the former are the types of *Salarias æquipinnis*, Günther.

Genus, 5—TRIPTERYGIUM, *Risso.*

Branchiostegals six: pseudobranchiæ. Body moderately elongated. Snout of medium extent. Villiform teeth in jaws, also present on palate. Three dorsal fins, the two first consisting of spines, the first fin containing less spines than the second, which is also of greater extent than the third rayed fin. Ventrals jugular, with two rays. Scales present, small or of medium size.

Geographical distribution.—Mediterranean, Bay of Bengal, Malay Archipelago to New Zealand.

I have never obtained any species of this Genus in India, nor seen specimens from thence. That it exists there however is certain, as amongst Sir W. Elliot's drawings coloured illustrations of a male and female of one species are given, and which may be the following.

1. Tripterygium trigloides.

? Bleeker, Biliton, iv, p. 234; Günther, Catal. iii, p. 279.

D. 3 | 13-14 | 10, P. 16, V. 2, A. 18-20, C. 21.

Length of head $3\frac{1}{2}$ to 4, of caudal 6 to $6\frac{1}{4}$, height of body 6 in the total length. *Eyes*—high up, profile in front of eyes oblique, upper jaw the longer. A fringed tentacle over the orbit and another at the nostrils. *Fins*—the three different portions of the dorsal fins are notched to their bases: caudal rounded. *Colours*—light brown, with vertical bars on the body, and fine black spots. In the *male* the upper surface of the head is orange, the lower half Prussian blue. A dark blue ocellus, having an orange margin, on the base of the pectoral fin. First dorsal orange. In the *female* the lower surface of the head is light blue, and the ocellus on the pectoral less distinctly marked.

Habitat.—Found amongst the rocks at Waltair. Specimens were packed to be brought to Europe by Sir W. Elliot, but destroyed in a storm along with many other interesting objects of Natural History.

B. No molar teeth. Caudal continuous with vertical fins.

Genus, 6—XIPHASIA, *Swainson.*

Nemophis, Kaup.: *Xiphogadus*, Günther.

Branchiostegals six. Body elongated, eel-like, and posteriorly compressed. Suborbital bone rough. Eyes

lateral. Gill-opening small, placed before the base of the pectoral fin. Teeth in maxilla of subequal size, conical, and placed close together, with a lateral canine: in the lower jaw more curved: palate edentulous. Fin rays flexible, the dorsal commences on the head, it and the anal are united to the caudal. Ventral of three rays inserted anterior to the branchial orifice.

The fishes of this Genus were but imperfectly known, until Dr. Bleeker, in 1863, discovered a specimen in the Leyden Museum. In his Memoir he showed *Xiphasia* to belong to the *Blenniidæ*, or in fact a *Petroscirtes*, having a tænioid or eel-like body, with the dorsal and anal fins united to the caudal, he therefore placed it in the present family. He also surmised that *Nemophis*, Kaup, might be a fish of this Genus, perhaps wanting the ventral and caudal fins.

Dr. Günther remarks, (Zool. Record, 1868, p. 150), " the Recorder has recently had an opportunity of examining nine examples obtained in various parts of the Indian Ocean, and convinced himself, 1, that *(Xiphogadus) Xiphasia* is identical with *Nemophis* of Kaup (who overlooked the ventral fins); and, 2, that although the examples examined by him may belong to two distinct species, differing only in the extent of the snout, there is no evidence to show that the fishes described by Rüppell, Kaup, and Bleeker are specifically distinct.* He makes this observation on account of Col. Playfair having described as a fourth species a *Xiphogadus Madagascariensis*, Proc. Zool. Soc. 1868, p. 11. Having examined the typical example (which is in a very bad state) the Recorder may add that it cannot be made the type of a distinct species."

Amongst Sir W. Elliot's drawings is a figure of one of these fishes which may be a new species, or the caudal fin of Russell's specimen may have been injured, I have given it from the illustration alluded to, Jerdon (M. J. L. and Sc. 1851, p. 139) observes of the fishes from which the figure was drawn, " I one day procured two specimens of this very curious species of *Gymnotus*, which Swainson has named from Russell's figure, which however is very defective. Its tail ends in a long filament, and the dorsal and anal fins are much higher than is there represented."

Examining the figure of *Xiphasia trachypareia*, Bleeker, with Sir Walter Elliot's and Jerdon's, I am unable, without further proof, to consider them identical unless great sexual differences exist. At the end of the tail in Russell's specimen are two very short filaments. However, I am inclined to think Jerdon was correct in considering his species as most probably Russell's.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Xiphasia setifer*, D. 223 (? 123), A. 112.

1. Xiphasia setifer, Plate LXXIII, fig. 1.

? Ophidium tonkah-talawarec, Russell, Fish. Vizag. i, p. 28, pl. xxxix.
? Xiphasia setifer, Swainson, Fishes, ii, p. 259.
Xiphichthys Russellii, Jerdon, M. J. L. and Sc. 1851, p. 139 (not Swainson).
? Xiphogadus setifer, Günther, Catal. iv, p. 374.

B. vi, D. 223 (? 123), P. 13, V. 3 (?), A. 112, C. 10.

Russell's figure shows D. 123, not 223 as stated in the text, and which is probably a misprint. This fish has an eel-like body and high vertical fins.

The figure is from a drawing in Sir W. Elliot's collection, and which has been named *X. setifer* by Jerdon who remarks, " said to be venomous."

Habitat.—Coromandel coast of India.

* *X. setifer* appears to have its central caudal ray or two rays elongated: *X. trachypareia*, Bleeker=*X. Madagascariensis*, Playfair, has the dorsal fin commencing above the eyes; *X Lessonii*, Kaup, has it beginning behind the eyes.

Family, XXXI—RHYNCHOBDELLIDÆ, *Bleeker.*

Scomberoidei, pt., Cuv. and Val.; *Mastacembelidæ*, Günther.

Branchiostegals six: pseudobranchiæ absent. Gill-opening, a slit on the side of the head: gills four. Body elongated, eel-shaped. Humeral arch not suspended from the skull. Lower jaw long, but without much power of motion. A single long dorsal fin, its anterior portion consisting of free spines: anal with three spines anterior to it: soft dorsal and anal of similar extent: ventral fins absent. Air-vessel present. Pyloric appendages two.

Geographical distribution.—Fresh and brackish waters of Syria, Sind, India, Ceylon, Burma, the Malay Archipelago. They are found far inland, and often at great elevations.

Uses—excellent as food, although owing to their resemblance to eels (in fact they are eels with spines) or snakes some people object to them. Buchanan observes that they "have less of a disgusting appearance than those called *Muræna*, and are more sought after by the natives, the highest of whom in Bengal make no scruple of eating them; and by Europeans they are esteemed the best of the eel-kind." They salt well, but their flesh is reputed to be slightly heating.

SYNOPSIS OF GENERA.

1. *Rhynchobdella.* Snout fleshy, transversely striated inferiorly: no preorbital spine. From Syria, Sind, India, Burma, to the Malay Archipelago, and beyond.

2. *Mastacembelus.* Snout fleshy, not transversely striated inferiorly: a preorbital spine. From Syria, through India, to the Malay Archipelago and beyond.

Genus, 1—Rhynchobdella, *Bloch, Schneider.*

Mastacembelus, Gronov.

Branchiostegals six. Cleft of mouth narrow: a long and fleshy snout, inferiorly concave, and transversely striated. Minute teeth on jaws and vomer. Dorsal and anal not confluent with the caudal fin. Scales small, cycloid. Lateral-line present. Air-vessel elongated.

Geographical distribution.—Prefers ponds or pieces of water in which mud abounds: it is found in the deltas of all large rivers of Sind, India, and Burma.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Rhynchobdella aculeata*, D. 16-20 | 44-54, A. 2-3 | 44-52. A series of from three to nine large black ocelli, with a light edge, along the base of the soft dorsal fin (they are occasionally absent). Deltas of large Indian and Burmese rivers.

1. Rhynchobdella aculeata, Plate LXXII, fig. 1.

Ophidium aculeatum, Bloch. tab. 159, f. 2; Gmel. Linn. p. 1147.
Rhynchobdella Orientalis, Bl. Schn. p. 478.
Rhynchobdella aral, Bl. Schn. p. 479, tab. 89; Cuv. and Val. viii, p. 445, pl. 239.
Macrognathus aculeatus, Lacép. ii, p. 284; Ham. Buch. pp. 29, 364.
Rhynchobdella ocellata, Cuv. and Val. viii, p. 445.
Mastacembelus pentophthalmos, Gronov. ed Gray, p. 172.
Rhynchobdella aculeata, Jerdon, M. J. L. and Sc. 1848, p. 147; Günther, Catal. iii, p. 540.
Aral, Tam.; *Bommiday*, Telugu; *Theliya*, Singhalese (Tennant); *Tou-rah*, Assam.; *Sand* and *Spined eels*; *Bara* and *Thuri*, Ooriah; *Nga mawaydoh nya*, Burmese.

B. vi, D. 16-20 | 44-54, P. 23, A. 2-3 | 44-52, C. 15, Vert. 32/40.

Length of head from 5 to 6, of pectoral 23 to 28, of caudal 10 to 15, height of body 8 to 10 in the total length. *Eyes*—1 diameter apart. Snout fleshy, elongated, with a trilobed anterior extremity, its inferior surface concave, transversely striated. The maxilla reaches to below the front nostril. Preopercle entire, no preorbital spine. *Fins*—the first dorsal consisting of spines, which increase in length posteriorly, they begin at the commencement of the second seventh of the length of the fish. Soft dorsal and anal separated by a deep notch from the caudal, which is rounded. Second pre-anal spine longest and strongest. *Air-vessel*—extends from the head to the anus. *Colours*—brownish or greenish, marbled superiorly, becoming yellowish along the abdomen: a light band along the body just above the lateral-line. A series of from three to nine large black ocelli, having a white or buff edge, along the base of the soft dorsal fin. Caudal with from six to eight vertical brown bars, fins otherwise grayish. Pectoral sometimes yellow. The body has several longitudinal bands in Sind.

In some large specimens from the Kistna there were no ocelli. In others at Moulmein, in Burma, the fish were covered with white spots, the fins reddish, and the dorsal barred.

Habitat.—Brackish waters within tidal influence, also throughout the deltas of large Indian, Burmese, and Sind rivers, but appears to be absent from the northern portions of the Punjaub and the Malabar coast: it extends to Borneo and the Moluccas: attaining about 15 inches in length. It conceals itself in the mud, and becomes drowned if placed in water so as to be unable to reach the surface, apparently requiring to respire air directly.

Genus, 2—MASTACEMBELUS, Cuv. and Val.

Branchiostegals six. Cleft of mouth narrow: a long fleshy appendage to the snout, which is not transversely striated inferiorly. Preopercle generally with spinate teeth at its angle: a preorbital spine. Teeth in jaws minute. Dorsal and anal fins confluent with, or distinct from, the caudal. Scales small, cycloid. Lateral-line present. Air-vessel elongated.

A. *Vertical fins distinct from the caudal.*

1. *Mastacembelus unicolor*, D. 33-34 | 81-94, A. 3 | 75-95. Of an uniform brown colour: or covered with large yellow blotches. Burma to Java.

2. *Mastacembelus zebrinus*, D. 28-29 | 50-52, A. 3 | 51-56. Yellow with vertical blue stripes: fins striped or spotted. Burma.

3. *Mastacembelus pancalus*, D. 24-26 | 30-42, A. 3 | 31-46. Sides spotted with yellowish-white: posterior portion of body more or less banded. Vertical fins with fine black spots. Deltas of large rivers in India and Assam, but not extending to southern India or Burma.

B. *Vertical fins confluent with the caudal.*

4. *Mastacembelus armatus*, D. 32-39 | 74-90, A. 3 | 75-88. Spinous dorsal commences over middle of pectoral fin, 30 rows of scales between the lateral-line and base of first dorsal ray. Greenish, marbled, spotted, with or without undulating lines.

5. *Mastacembelus Güntheri*, D. 27-30 | 60-74, A. 3 | 62-75. Spinous dorsal commences behind the vertical from the end of the pectoral fin: 15 rows of scales between the lateral-line and base of first dorsal ray. Brownish or olive, marbled and spotted: some dark bands radiate from the eye. Malabar coast.

1. Mastacembelus unicolor, Plate LXXII, fig. 3.

(Kuhl and v. Hass.) Cuv. and Val. viii, p. 453; Bleeker, Notae. p. 5; Günther, Catal. iii, p. 542.

B. vi, D. 33-34 | 81-94, P. 27, A. 3 | 75-98, C. 25.

Length of head $5\frac{1}{4}$, of caudal 18, height of body $10\frac{1}{2}$ in the total length. *Eyes*—1 diameter apart. Width of head equals 1/4 of its length, and its height $2\frac{1}{3}$ in its length. Snout with two small tentacles near its extremity. The maxilla reaches to below the front nostril. Three strong denticulations at angle of the preopercle: a preorbital spine. *Fins*—dorsal spines short, increasing in length posteriorly, they commence over the middle of the pectoral. Second dorsal and anal divided from the caudal by a deep notch, the latter fin rounded. Second pre-anal spine the longest and strongest. *Colours*—brownish superiorly, becoming lighter coloured beneath: three or four rows of oblong, rounded, or irregularly shaped yellow spots or blotches along the sides: vertical fins with a black yellow-margined outer edge. Pectorals are said to have two cross-bands. The original specimen was of an uniform colour, hence its name.

The specimen figured (life-size) was received from Professor Peters, of Berlin. It was captured at Rangoon, and although possessing D. 33 | 94, A. 3 | 98, is evidently Cuv. and Val.'s species.

Habitat.—Burma to Java.

2. Mastacembelus zebrinus, Plate LXXII, fig. 3.

Blyth, J. A. S. of Bengal, 1859, p. 281; Günther, Catal. iii, p. 541; Day, Proc. Zool. Soc. 1869, p. 521.
Nya-ma-way-doh-wettung, Burmese.

B. vi, D. 28-29 | 50-52, P. 19, A. 3 | 51-56, C. 19.

Length of head 6 to 7, height of body 7 to $7\frac{1}{2}$ in the total length. *Eyes*—small, situated before the middle of the length of the head. Snout trilobed at its extremity. The greatest width of the head equals 1/2 the length of the postorbital portion of the head: its height equals 1/2 its length excluding the snout. The maxilla reaches to below the nostril. Three strong denticulations at the angle of the preopercle: a preorbital spine. *Fins*—dorsal spines short, increasing in length posteriorly, they commence over the middle of the pectoral fin. Soft dorsal and anal separated from the caudal by a notch, the last fin rounded. Second pre-anal spine longest and strongest. *Scales*—20 rows between the lateral-line and the commencement of the soft dorsal fin. *Colours*—greenish along the back, becoming lighter on the sides and beneath, bluish vertical bands, either edged on either side with a golden one, or else the two alternating. Dorsal and caudal fins banded in dots: anal with the body bands continued on to it, and having intermediate dark ones.

Habitat.—This species is the common one throughout the fresh waters of Burma, entirely superseding the *M. pancalus* of Bengal and Assam, it is found in the Irrawaddi, in Upper Burma to far above Ava. The specimen figured (life-size) is from British Burma. It attains at least 9 inches in length.

3. Mastacembelus pancalus, Plate LXXII, fig. 4.

Macrognathus pancalus, Ham. Buch. Fish. Ganges, pp. 30, 364, pl. 22, f. 7.

Mastacembelus pancalus, Cuv. and Val. viii, p. 455; Bleeker, Beng. en Hind. p. 98; Günther, Catal. iii, p. 541.

Mastacembelus punctatus, Cuv. and Val. viii, p. 463.

Chen-da-la, *Gürchee* and *Gro-age*, Punj.: *Ju-gar*, N. W. Prov.: *Par-pa-raal*, Tel.: *Turi* and *Bahru*, Ooriah: *Tu-rah*, Assam.

B. vi, D. 24-26 | 30-42, P. 19, A. 3 | 31-46, C. 12.

Length of head 5 to $5\frac{1}{2}$, of pectoral 12, of caudal 13, height of body $6\frac{1}{2}$ to 7 in the total length. *Eyes*—small, situated before the middle of the length of the head, 1 diameter apart. Snout trilobed at its extremity. The greatest width of the head equals 1/2 of the length of the postorbital portion of the head: its height equals half its length excluding the snout. The maxilla reaches to nearly beneath the nostril. A strong denticulation at the angle of the preopercle, followed by from three to five more along its lower border: a preorbital spine. *Fins*—dorsal spines short, increasing in length posteriorly, they commence over the middle of the pectoral fin. Soft dorsal and anal separated from the caudal by a notch, the last fin rounded. Second pre-anal spine longest and strongest. *Scales*—18 rows between lateral-line and commencement of dorsal rays. *Colours*—greenish-olive along the back, becoming yellowish beneath, having many yellowish-white spots over the sides. The posterior portion of the body is often vertically striped. Soft dorsal, pectoral, caudal, and anal yellow, with numerous black spots.

In upper Assam the body is more banded, and I found D. 26 | 42, A. 3 | 46, in one specimen. *M. pancalus* is so similar to, though smaller than, the *M. zebrinus*, that I cannot resist the belief that they may be merely varieties of one species.

This fish is termed "*Gangr-gongti* at Bhagalpur and Patnicola: *Gochi* at Konggspur: *Pangkal*, Calcutta," Ham. Buch. MSS.

Habitat.—Deltas of large rivers of India and localities near the sea. I have taken it near where the Ganges debouches from the Himalayas (Hurdwar), also at Jubbulpore, but have not seen it on the Coromandel coast south of the Kistna river. The one figured (life-size) is from Calcutta. It attains at least 7 inches in length.

4. Mastacembelus armatus, Plate LXXIII, fig. 2.

Macrognathus armatus, Lacép. ii, p. 286; Ham. Buch. Fish. Ganges, pp. 28, 364, pl. 37, f. 6.

Mastacembelus armatus, Cuv. and Val. viii, p. 456, pl. 240; Sykes, T. Z. Soc. ii, p. 350, pl. 60, f. 2; Günther, Catal. iii, p. 542; Day, Fish. Malabar, p. 153.

Mastacembelus Ponticerianus, Cuv. and Val. viii, p. 460; Jerdon, Madr. J. L. and Sc. 1848, p. 147.

Mastacembelus marmoratus, Cuv. and Val. viii, p. 461; Jerdon, l. c. p. 147.

? *Macrognathus caudatus*, McClell. C. J. N. H. ii, p. 586.

Macrognathus undulatus et *Hamiltonii*, McClell. C. J. N. H. iv, pp. 393, 398, pl. 22, f. 1.

Bahm, *Vahm*, and *Gro-age*, Punj. and Sind: *Kul-aral* and *Sha-ta-rah*, Tam.: *Mudi-bom-mi-day*, or "*Old Rhyncholdella*," Tel.: *Bahm*, *Bummi*, and *Gonti*, Ooriah and Beng.: *Nga-maway-doh-nga*, Burm.; "Thorny-backed eel."

B. vi, D. 32-39 | 74-90, P. 23, A. 3 | 75-88.

Length of head from $6\frac{1}{2}$ in the young to $7\frac{1}{2}$ in the adult, of caudal 18 to 20, height of body 11 to 12 in the total length. *Eyes*—one diameter apart. The height of the head equals rather above 1/2 its length behind the angle of the mouth: its width half of its postorbital length. The width of the body alters with age, in the young it is often only 2/3 of its height, but in the adult its width equals its height. The distance from the eye to the end of the snout equals about 1/3 of the length of the head. Snout trilobed at its anterior extremity. The maxilla reaches to below the front edge of the eye. Angle of preopercle with two or three strong denticulations: a preorbital spine. *Fins*—the dorsal spines commence over the middle of the pectoral fin, the posterior being the longest. Vertical fins confluent. In some young from the Coromandel coast the caudal fin is rather pointed (*M. Ponticerianus*, C.V.). *Scales*—about 30 rows between the lateral-line and the base of the first dorsal ray. *Colours*—this fish is usually of a rich brown colour, becoming lighter on the abdomen. In some a blackish band goes through the eye and is continued in an undulating course along the upper half of the side: above this band there are sometimes a row of black spots along the base of the soft dorsal fin, added to which there may be short black bands over the back in the situation of the dorsal spines. This is the most common form in Calcutta, Assam, and along the Himalayas. Pectoral usually spotted, and the dorsal and anal have usually bands or spots.

Some are marbled all over the sides as shown in Sykes' figure.

The variety, *M. marmoratus*, is by far the handsomest species, and found in Mysore and the Bowany river. It is of a general purplish colour, marbled all over with darker. The head has wide dark bands broken up into angular or irregularly shaped spots by narrow white lines. Pectoral with its basal third purple, its middle third with narrow yellow lines, and its outer third yellow.

The variety, *M. Ponticerianus*, was established for the reception of some small specimens with rather pointed tails from Pondicherry. It is the common variety at Madras.

Amongst Sir W. Elliot's drawings is one of the spotted variety of this fish termed *Rati papirai*, from the Condapilly tank.

In the Catal. of Fishes, Brit. Mus. iii, p. 541, Dr. Günther mentions under the head of *M. Aleppensis*, a fourth specimen, D. 35 spines, uniform brown-black, and not specifically distinct: it was received from the East India Company, and this is the only specimen in spirit stated to have come from their Museum. In the Calc. J. N. H. ii, p. 573, is a list of the fishes sent by McClelland to the India House Museum. Amongst them is *Macrognathus caudatus*, McClell. said to have 30 prickles or more in front of the dorsal fin. Perhaps it may be this very specimen.

Habitat.—This fish extends from Sind, throughout the fresh and brackish waters of the plains and hills of India, Ceylon, and Burma to China, attaining two feet or more in length. It is good eating, especially when curried or fried. The specimen figured is life-size.

5. **Mastacembelus Guentheri**, Plate LXXIII, fig. 3.

Day, Proc. Z. Soc. 1865, p. 37, and Fish. Malabar, p. 154, pl. xi.

? *Mastacembelus Malabaricus*, Jerdon, M. J. L. and Sc. 1848, p. 147.

B. vi, D. 27-30 | 60-74, P. 15, A. 3 | 62-75, C. 9.

Length of head 7, of pectoral 20 to 23, of caudal 17 to 19, height of body 8 to 9 in the total length. *Eyes*—one diameter apart. Height of the head equals 1/2 its length behind the angle of the mouth: its width equals half of its postorbital length. The height of the body equals the length of the head behind the angle of the mouth, its width is not quite 1/2 its height. Snout a little more than or about 1/2 the length of the head, the fleshy prolongation trilobed at its extremity. The maxilla does not reach to below the nostril. Angle of preopercle with two strong denticulations which decrease in size with age, the young have the lower margin also serrated. A preorbital spine. *Fins*—the dorsal spines commence on a vertical behind the end of the pectoral fin and are short, the posterior ones being the longest. Vertical fins confluent, but a slight notch apparent in the adult which is not seen in the young. *Colours*—olive or greenish-brown, becoming dull yellow inferiorly, some black bands radiate from the eye and cross the under surface of the jaws. A light band runs along the upper edge of the lateral-line, whilst short oblique bars or marblings exist on the body and which are continued on to the vertical fins.

This may be *M. Malabaricus*, Jerdon, for he observes that his species is less thick in proportion to its length than *M. armatus*. He gives the following formula, D. 37 | 74 ?, A. 3—74, the D. 37 may be a misprint for D. 27.

M. Guentheri has only 15 rows of scales between the lateral-line and the base of the first rays of the soft dorsal fin: the distance from behind the eye to the first dorsal spine equals $5\frac{3}{4}$ in the length of the fish behind the eye: the length of the base of the spinous dorsal is not equal to half the distance behind the end of the pectoral fin.

M. armatus has 30 rows of scales between the lateral-line and the base of the first ray of the soft dorsal fin: the distance from behind the eye to the first dorsal spine equals from $7\frac{1}{4}$ to 8 in the length of the fish posterior to the eye: the length of the base of the spinous dorsal equals half the length of the fish behind the preopercle.

Habitat.—Malabar coast, the specimen figured (life-size) is from Malabar. It attains 8 or 9 inches in length and is good eating.

Family, XXXII—SPHYRÆNIDÆ, *Agassiz*.

Percoidei, pt., Cuv.

Branchiostegals seven: pseudobranchiæ. Body elongate, sub-cylindrical. Eyes of moderate size, lateral. Cleft of mouth deep. Teeth in the jaws large and cutting: present on palate, none on vomer. Two short dorsal fins remote from each other: anal similar to the second dorsal: ventral abdominal situated more or less opposite the first dorsal fin, and consisting of one spine and five rays. Scales, small, cycloid. Lateral-line continuous. Air-vessel present, bifurcated anteriorly. Pyloric appendages in moderate numbers or numerous.

Geographical distribution.—These carnivorous fishes are found in the seas of temperate and tropical regions. The Barracuda, *Sphyræna picuda*, is often more dreaded in the seas it inhabits than the shark. They are not much esteemed for the table.

Genus, 1—Sphyræna, *Artedi*.

Definition as in the Family.

SYNOPSIS OF SPECIES.

1. *Sphyræna jello*, D. 5 | $\frac{1}{9}$, A. $\frac{1}{8-9}$, L. l. 120, L. tr. 18/22. Opercle with two points. Gray with a festooned band or short vertical bars along the sides. Red Sea, seas of India to the Malay Archipelago and beyond.
2. *Sphyræna acutipinnis*. D. 5 | $\frac{1}{9}$, A. $\frac{1}{8}$, L. l. 120, L. tr. 14/18. Opercle with a single point. Sind.
3. *Sphyræna Commersonii*, D. 5 | $\frac{1}{9}$, A. $\frac{1}{9}$, L. l. 90-95. Opercle with two points. Fins with white tips. India to the Malay Archipelago and beyond.
4. *Sphyræna obtusata*, D. 5 | $\frac{1}{9}$, A. $\frac{1}{9}$, L. l. 90, L. tr. 9/17. Opercle ending in a single point. Seas of India to the Malay Archipelago and beyond.

1. Sphyræna jello.

Esox sphyræna, Russell, Fish. Vizag. ii, p. 59 (not Gmel. Linn.), and *Jellow*, pl. 174.

Sphyræna jello, Cuv. and Val. iii, p. 349; Bélanger, Voy. Zool. p. 346, pl. i, f. 1; Rüppell, N. W. Fische, p. 88; Bleeker, Perc. p. 56, Batjam, p. 369, and Sphyr, p. 12; Cantor, Catal. p. 24; Jerdon, M. J. L. and Sc. 1851, p. 140; Günther, Catal. ii, p. 337; Day, Fish. Malabar, p. 64; Kner, Novara Fische, p. 139; Klunz. Verh. z. b. Ges. Wien, 1870, p. 823.

Cheelahoo, Mal.

B. vii, D. 5 | $\frac{1}{9}$, P. 14, V. 1/5, A. $\frac{1}{8-9}$, C. 17, L. l. 120, L. tr. 18/22, Vert. 12/12.

Length of head from $3\frac{1}{2}$ to 4, of pectoral 11, of caudal 6, height of body 8 to 9 in the total length. Thickness of the body equals 3/4 of its height. *Eyes*—diameter from 5 in the young to $6\frac{1}{2}$ in the length of the head, $2\frac{1}{2}$ to 3 diameters from end of snout, and 1 to $1\frac{1}{4}$ apart. The height of the head equals 4/11 of its length, and its width equals 2/7. The maxilla extends to below the front edge or first third of the eye: lower jaw the longer, with a fleshy tubercle at the end of the symphysis. Angle of preopercle obliquely rounded, opercle with two points. *Teeth*—small in the upper jaw, about 18 in the mandible, increasing in size posteriorly. About six large ones in the anterior portion of the palatines. *Fins*—the first dorsal commences above the end of the pectoral fin and a little behind the origin of the ventral: central caudal rays about 4/9 the length of the longest outer ones, the upper lobe often the longer. *Colours*—superiorly gray, becoming white on the abdomen. On the upper part of the side a festooned band intersects the lateral-line, or a number of short vertical gray bands (up to 22) cross it. Ventrals whitish: the other fins yellowish with fine black points, most numerous towards their margins.

Habitat.—Red Sea, east coast of Africa, seas of India to the Malay Archipelago and beyond. Attaining at least 5 feet in length.

2. Sphyræna acutipinnis, Plate LXXIX, fig. 1.

B. vii, D. 5 | $\frac{1}{9}$, P. 15, V. 1/5, A. $\frac{1}{8}$, C. 17, L. l. 120, L. tr. 14/18.

Length of head $3\frac{1}{2}$, of caudal $6\frac{1}{4}$, height of body $9\frac{1}{2}$, width of body $10\frac{1}{2}$ in the total length. *Eyes*—diameter 1/6 of length of head, $2\frac{1}{2}$ diameters from end of snout, and $1\frac{1}{2}$ apart. The height of the head equals its postorbital length, whilst its width is a little less. Lower jaw considerably produced beyond the upper, which is truncated anteriorly, there is a small fleshy knob at the end of the mandible. The maxilla does not extend so far as to below the anterior edge of the eye. Angle of preopercle rounded: opercle ends in a single fleshy point. *Teeth*—about 18 on each limb of the lower jaw, half of which are of moderately large size, a large fang anteriorly in the lower and two in the upper jaw, three large teeth on the palate. *Fins*—first dorsal commences very slightly nearer the end of the lower jaw than it does to the base of the caudal, it arises opposite the end of the pectoral, and a little anterior to the origin of the ventral,

the interspace between the two dorsal fins equals half the length of the head. Pectoral eqnal to $10\frac{1}{2}$ in the total length. Caudal deeply forked. *Scales*—12 rows between the lateral-line and the base of the first dorsal fin: some on opercles. *Colours*—dark leaden superiorly, becoming dull white beneath. Fins stained with gray.

This species is allied to *S. Fosteri*, C. V., but the pectoral arises in *S. Fosteri*, *behind* the root of the ventral. In Cuv. and Val. it is said that the ventral and first dorsal are opposite the end of the pectoral, and in Vol. vii. that the eye is very large, which latter is not the case in the specimen I have described.

Habitat.—The specimen figured is 20 inches in length, and from Sind.

3. Sphyræna Commersonii.

Cuv. and Val. iii, p. 352; Bleeker, Perc. p. 55, Java, p. 425, and Sphyr. p. 15; Günther, Catal. ii, p. 338. *Sphyræna Dussumieri*, Cuv. and Val. vii, p. 508; Günther, Catal. ii, p. 339.

B. vii, D. 5 | $\frac{1}{9}$, P. 14, V. 1/5, A. $\frac{1}{9}$, C. 19, L. l. 90-95, L. tr. 11/16.

Length of head $3\frac{3}{4}$ to 4, of caudal $5\frac{2}{3}$, height of body $7\frac{1}{2}$ to 9 in the total length. *Eyes*—diameter from 5 in the young to $7\frac{1}{2}$ in the length of the head, $2\frac{1}{4}$ to $3\frac{1}{4}$ diameters from end of snout, and from 1 to $1\frac{3}{4}$ apart. Height of head equals about 1/2 its length, and its width not quite 1/3. The maxilla reaches to beneath the front edge or first third of the eye: lower jaw the longer, with a fleshy tubercle at the end of the symphysis. Angle of preopercle obliquely rounded: opercle with two points. *Teeth*—in the upper jaw smaller than those in the lower, which consist of from 20 to 22: about six large ones in the anterior portion of the palatines. *Fins*—the first dorsal commences above the ventral and opposite the last fourth or even the end of the pectoral, the interspace between the two dorsal fins is from 5 to $5\frac{1}{2}$ in the total length. *Colours*—bluish above, silvery beneath: dorsal, caudal, and anal black, with white tips.

Habitat.—Seas of India to the Malay Archipelago and beyond. Bleeker's specimens of *S. Commersonii* are identical with *S. Dussumieri* in the British Museum and in my own collection. All have two, not one, opercular points. It attains at least $4\frac{1}{2}$ feet in length.

4. Sphyræna obtusata, Plate LXXI, fig. 5.

? ? *Sphyræna Chinensis*, Lacép. v, p. 321, t. 10, f. 2.

Sphyræna obtusata, Cuv. and Val. iii, p. 350; Bleeker, Sphyr. p. 17, and Batjan, p. 364; Cantor, Catal. p. 24; Temm. and Schleg. Fauna Japon. pl. 13, f. 2; Jerdon, M. J. L. and Sc. 1851, p. 140; Günther, Catal. ii, p. 339; Kner, Novara Fische, p. 140; Klunz. Verh. z. b. Ges. Wien, 1870, p. 820.

Sphyræna flavicauda, Rüpp. N. W. Fische, p. 100, t. 25, f. 3.

B. vii, D. 5 | $\frac{1}{9}$, P. 14, V. 1/5, A. $\frac{1}{9}$, C. 17, L. l. 90, L. tr. 9/17, Cæc. pyl. about 24.

Length of head $3\frac{1}{2}$, of caudal $6\frac{1}{3}$, height of body $6\frac{1}{2}$ (8 ?) in the total length. *Eyes*—diameter $4\frac{1}{4}$ in length of head, $1\frac{1}{2}$ diameters from end of snout, and a little more than 1/2 a diameter apart. Height of head equals 4/9 to 2/5 of its length. The maxilla reaches to nearly or quite below the front edge of the eye. A slight fleshy knob at end of lower jaw. Preopercle nearly rectangular, with its angle a little produced, the opercle terminating in a single flat membranous point. *Teeth*—about 20 on either ramus of the lower jaw, the 9 or 10 posterior ones being the largest, with an anterior central fang: one or two large fangs anteriorly in the upper jaw: and three large fangs in front of palatines, followed by a single row of small teeth. *Fins*—the posterior end of the opercle is midway between the centre of the eye and the commencement of the first dorsal fin, which last arises over the last fourth of the pectoral and a little behind the ventral, which is inserted under the middle of the pectoral. The interspace between the two dorsal fins equals half the length of the head. Caudal not so deeply lobed as in *S. jello*, the central rays being 1/2 or less than the length of the longest outer ones. *Scales*—extended over the opercles and cheeks. *Colours*—grayish-green superiorly, whitish along the abdomen, the gray descends in a festooned edge below the lateral-line. Pectorals grayish, the other fins yellowish.

The figure of *S. Chinensis*, Lacép., shows the first dorsal fin rather more advanced than exists in *S. obtusata*. The fish figured in the Fauna Japonica has a shorter head and a much longer interspace between the two dorsal fins than is seen in the species described above: but the specimen from which the drawing was made belongs to this species.

Habitat.—Seas of India to the Malay Archipelago and Australia: the specimen figured is from Madras.

Family, XXXIII—ATHERINIDÆ, *Günther.*

Branchiostegals five or six: pseudobranchiæ. Four gills: gill-opening wide. Body more or less elongated and somewhat sub-cylindrical. Eyes lateral. Gape of mouth of moderate width: cleft not very deep. Teeth minute. Two dorsal fins, not joined, the spines of the first feeble, and less in number than the rays of the second, which is similar to the anal: ventral abdominal, with one spine and five rays. Scales of medium size, cycloid. Lateral-line indistinct. Pyloric appendages, if present, few. Air-vessel present. Vertebræ numerous in the abdominal and caudal portions.

Geographical distribution.—These pretty little fishes, with a burnished silvery lateral band, are distributed in nearly all the seas of temperate and tropical regions, they are captured in numbers along the coast, and also in estuaries and tidal rivers when not far removed from the sea.

Uses.—Although so small, being rarely 3 inches in length, they are dried in the sun and exported to distant markets. Many are imported into the Western coast of India from the Arabian Gulf, but these before being sun-dried are evidently soaked in brine.

Genus, 1—Atherina, *Artedi.*

Body somewhat sub-cylindrical, with slightly compressed sides. Snout more or less obtuse, with the cleft of the mouth oblique, extending backwards to at least as far as to below the anterior edge of the orbit. Teeth very minute, but usually present on jaws, palate, and tongue. Ventrals some distance posterior to the pectorals. Scales of moderate size. Air-vessel present. Pyloric appendages, when present, few. Ova comparatively very large. A silvery lateral band.

SYNOPSIS OF SPECIES.

a. Teeth on palate.

1. *Atherina pinguis*, D. 5-6 | $\frac{1}{10}$, A. $\frac{1}{14-15}$, L. l. 42-45. East coast of Africa, seas of India, Malay Archipelago, and beyond.
2. *Atherina Forskalii*, D. 5-6 | $\frac{1}{9-10}$, A. $\frac{1}{13-14}$, L. l. 40. Red Sea, East coast of Africa, seas of India to the Malay Archipelago.
3. *Atherina duodecimalis*, D. 5 | $\frac{1}{9}$, A. $\frac{1}{11}$, L. l. 35. Ceylon and Malay Archipelago.

b. No palatine teeth.

4. *Atherina melanostigma*, D. 5 | $\frac{1}{10}$, A. $\frac{1}{13}$, L. l. 37. Madras.

A. *Teeth on palate.*

1. Atherina pinguis.

Atherina hepsetus, Forsk. p. 69 (not Linn.).

Atherina pinguis, Lacép. v, p. 372, pl. xi, f. 1; Bleeker, Act. Soc. Ned. Ind. viii, and Sumatra, viii, p. 24; Günther, Catal. iii, p. 399; Klunz. Verh. z. b. Ges. Wien, 1870, p. 833.

Atherina affinis, Benn. Proc. Zool. Soc. 1831, i, p. 166.

Atherina pectoralis, Cuv. and Val. x, p. 447.

B. vi, D. 5-6 | $\frac{1}{10}$, P. 16, V. 1/5, A. $\frac{1}{14-15}$, C. 17, L. l. 42-45, L. tr. 7, Vert. 20/23.

Length of head $4\frac{1}{3}$ to $4\frac{2}{3}$, of caudal $5\frac{1}{2}$, height of body $5\frac{2}{3}$ in the total length. *Eyes*—diameter 2/5 of length of head, 1/2 a diameter from end of snout, and 1 apart. The width of the head equals two-thirds of its length, and its height equals its length excluding the snout. Upper jaw overlapping the lower: the maxilla reaches to below the first fourth of the eye. *Teeth*—distinct in the jaws, vomer, and palatines. *Fins*—the posterior end of the opercle is midway between the snout and base of the first dorsal fin. *Colours*—the silvery lateral band includes the whole of the third and upper quarter of the fourth rows of scales: a blackish mark on the upper edge of the eye, also on posterior end of the pectoral and caudal fins.

"The abdominal and caudal portions of the vertebral column are nearly of equal length: the apophyses of the anterior caudal vertebræ do not form a canal for the air-bladder, as in *A. boyeri* and other species." Günther, l. c.

Habitat.—East coast of Africa, seas of India to the Malay Archipelago and beyond. It attains at least $5\frac{1}{2}$ inches in length.

2. Atherina Forskalii, Plate LXXI, fig. 4.

Atherina Forskalii, Rüpp. N. W. Fische, p. 132. t. 33, f. 1; Cantor, Catal. p. 103; Jerdon, M. J. L. and Sc. 1851, p. 140; Günther, Catal. iii, p. 397; Day, Fish. Mal. p. 135.

Ko-re-dah, Andam.

B. vi, D. 5-6 | $\frac{1}{9-10}$, P. 17, V. 1/5, A. $\frac{1}{13-14}$, C. 15, L. l. 40, L. tr. 6-7.

Length of head $4\frac{1}{3}$, of pectoral 8, of caudal 4 to 5, height of body 6 to $6\frac{1}{3}$ in the total length. *Eyes*—diameter 2/5 of length of head, 1/3 of a diameter from end of snout, and 1 apart. Height of head equals its length excluding the snout, whilst its width is slightly less. Abdominal profile more convex than that of the back. Cleft of mouth oblique, the maxilla reaches to below the first third of the eye: jaws of about equal length anteriorly, or the lower slightly the longer. Two or three large pores open along the upper margin of the opercle. *Teeth*—distinct in jaws and on vomer and palatines. *Fins*—the first dorsal commences rather nearer the base of the anal than that of the ventral, the posterior end of the opercle is midway between the end of the snout and the base of the first dorsal fin. Pectoral inserted above the centre of the depth of the body: caudal rather deeply lobed. *Scales*—with smooth edges. *Colours*—silvery, with the upper surface of the head and back of a pale sea-green, with numerous fine black points: the silvery lateral band includes the whole of the third and the upper half of the fourth row of scales: cheeks and opercles silvery: muzzle and lips blackish: edges of dorsal, pectoral, and caudal with fine black spots.

Habitat.—Red Sea, East coast of Africa, seas of India to the Malay Archipelago. It only reaches to a few inches in length, and is most commonly captured on the shores of India during the cold season. It is one of several genera, some species of which are indiscriminately termed "whitebait" by Europeans, and are dressed for the breakfast table.

Jerdon observes "*Mottechi*, Tam. sometimes *Motti kola kende*."

3. Atherina duodecimalis.

Cuv. and Val. x, p. 458; Bleeker, Riouw. p. 485; Günther, Catal. iii, p. 400.

B. vi, D. 5 | $\frac{1}{9}$, P. 15, V. 1/5, A. $\frac{1}{11}$, C. 17, L. l. 35.

Length of head 4 to $4\frac{1}{4}$, of pectoral $5\frac{1}{2}$, of caudal $5\frac{1}{2}$, height of body $5\frac{1}{2}$ in the total length. *Eyes*—diameter 1/2 length of head, 1/2 diameter from end of snout, and 3/4 apart. *Teeth*—distinct. Maxilla extends to below the middle of the orbit. *Fins*—first dorsal commences midway between the base of the ventral and anal. Anal arises anterior to the base of second dorsal: caudal forked: lower lobe the longer. *Scales*—cycloid. *Colours*—silvery, with a silver band along the third row of the scales, and a green band above it: no black dots on body: dorsal and caudal fins grayish.

Habitat.—Ceylon and Malay Archipelago, to at least $3\frac{1}{2}$ inches in length.

B. *No palatine teeth.*

4. Atherina melanostigma.

B. vi, D. 5 | $\frac{1}{10}$, P. 15, V. 1/5, A. $\frac{1}{13}$, C. 17, L. l. 37, L. tr. 7.

Length of head $4\frac{1}{3}$, of caudal $6\frac{1}{4}$, height of body $5\frac{1}{4}$ in the total length. *Eyes*—diameter 2/5 of length of head, 1/2 a diameter from end of snout, and 1 diameter apart. The height of the head equals its length excluding the snout, its width is slightly less. Cleft of mouth very oblique, the maxilla reaches to below the front edge of the eye: the lower jaw is rather broad anteriorly and a little shorter than the upper. *Teeth*—in jaws minute, none on the vomer or palate. *Fins*—dorsal spines feeble, the fin commences midway between the bases of the ventral and anal, the hind edge of the opercle is half-way between the snout and the base of the dorsal fin. *Scales*—edges a little rough, 16 rows anterior to the base of dorsal fin. *Colours*—a well-marked silvery band is confined to the third row of scales: there are many fine black dots along the back, especially on the edges of the scales, and a few in the lower half of the body. Base of pectoral densely dotted with black. A dark spot on the upper edge of the eye, another at the upper edge of the base of the caudal fin, which is also dark edged posteriorly. A dark line along the scales at the base of the anal fin.

Habitat.—Madras, to 3 inches in length.

FAMILY, XXXIV—MUGILIDÆ.

Branchiostegals from four to six: pseudobranchiæ. Gill-openings wide: gills four. Form of body oblong, compressed, whilst the head and anterior portion may be depressed. Eyes lateral, with or without adipose lids. Mouth narrow or of moderate width. Opercles usually unarmed. Teeth very fine, sometimes absent. Two dorsal fins, the first consisting of four stiff spines: anal slightly longer than the second dorsal: ventral abdominal and suspended from an elongated shoulder bone, it consists of one spine and five rays. Scales cycloid, rarely ctenoid. Lateral-line absent. Pyloric appendages generally few. Vertebræ 24.

In the marine forms of mullets the scales are usually cycloid or very feebly ctenoid, but in those species, *M. corsula*, *M. cascasia*, and *M. Hamiltonii*, which mostly or entirely reside in fresh water the scales are strongly ctenoid, and the two last have only two cæcal appendages.

These fishes are extensively distributed throughout the seas of India, some ascending tidal rivers or being found in estuaries. The young, as a rule, appear to enter large rivers and such congenial places. As regards the strictly fresh-water forms they seem to be confined to the larger rivers, as the Ganges, Jumna, and Irrawaddi.

As a rule these fishes in their fresh state are esteemed as food by both Europeans and natives, they are also extensively salted and sun-dried. In Canara an objection was raised to eating them, on the ground that their heads much resembled those of snakes.

As mullets putrefy very rapidly in hot climates, especially if large, the whole of their bodies become distended with gases.* This appearance may be persistent if the fish is not opened.

Genus, 1—MUGIL, *Artedi.*

Branchiostegals from four to six: pseudobranchiæ. Eyes with or without an adipose lid. Mouth more or less transverse, with a shallow cleft, and the anterior edge of the mandible sharp. Teeth, when present, minute. Pyloric appendages generally few (2-10). *Upper portion of the stomach very muscular.*

Fishes of this genus may for convenience be divided into those which possess, or are deficient in, adipose eyelids. In some the second dorsal commences opposite, anterior or posterior to the origin of the anal, whilst an elongated axillary scale may be present or absent. Usually fishes in this genus have eight or nine branched rays in the anal fin, counting the last divided to its base as one, but in some species, as *M. parsia*, either number may be found.

SYNOPSIS OF SPECIES.

A. *With adipose eyelids well developed.*

1. *Mugil speigleri*, A. $\frac{3}{9}$, L. l.† 40-42, L. tr. 11-12. Broad posterior eyelid. Head $4\frac{2}{3}$ to 5, height of body $4\frac{3}{5}$ to 5 in the total length. Eyes 2/7 of length of head, 3/4 of diameter from end of snout. Extremity of maxilla visible. Anterior fourth of anal before second dorsal. A long axillary scale, 22 rows before dorsal fin: twelfth and twenty-fifth scales of lateral-line correspond to origins of first and second dorsal fins. Dark axillary spot.

2. *Mugil cunnesius*, A. $\frac{3}{9}$, L. l. 35, L. tr. 12. Broad posterior eyelid. Head $5\frac{1}{4}$, height of body $4\frac{1}{2}$ in the total length. Eye $3\frac{1}{2}$ to 4 in length of head, 2/3 of a diameter from end of snout. Extremity of maxilla just visible. Anal commences rather anterior to second dorsal. A long axillary scale. Eighteen rows before dorsal fin: tenth and twentieth scales of lateral-line correspond to origins of first and second dorsal fins.

3. *Mugil carinatus*, A. $\frac{3}{9}$, L. l. 34-36, L. tr. 11. Broad posterior eyelid. Head $4\frac{1}{4}$ to $4\frac{1}{2}$, height of body 5 to $5\frac{1}{2}$ in the total length. Eyes $4\frac{1}{4}$ in length of head, 1 diameter from end of snout. Extremity of maxilla visible. Anal commences slightly anterior to second dorsal. No long axillary scale: 24 or 25 rows before dorsal fin: ninth and twenty-first scales of lateral-line correspond to origins of first and second dorsal fins. Base of pectoral dark.

4. *Mugil planiceps*, A. $\frac{3}{9}$, L. l. 33-35, L. tr. 11. Broad posterior eyelid. Head $4\frac{1}{2}$ to 5, height of body $5\frac{1}{2}$ to 6 in the total length. Eyes $6\frac{1}{2}$ to 7 in length of head, $1\frac{1}{2}$ diameters from end of snout. End of maxilla visible. Anal commences slightly anterior to the second dorsal. No long axillary scale: 20 rows before dorsal fin: tenth and twenty-first scales of lateral-line correspond to origins of first and second dorsal fins. A dark line along each row of scales.

5. *Mugil parsia*, A. $\frac{3}{8-9}$, L. l. 34-35, L. tr. 11-12. Broad posterior eyelid. Head 5 to $5\frac{1}{4}$, height of body

* A solution of carbolic acid added to the spirit appears very useful in partially or entirely preventing this.

† By L. l. in Mullets is meant the number of rows of scales from the axilla to the base of the caudal fin, as no true lateral-line exists.

$4\frac{1}{3}$ to $4\frac{1}{2}$ in the total length. Eyes $3\frac{1}{2}$ in length of head, 3/4 of a diameter from end of snout. End of maxilla visible. Anal commences slightly anterior to the second dorsal. No long axillary scale, 21 or 22 rows before dorsal fin, eleventh and twenty-second scales of lateral-line correspond to origins of first and second dorsal fins.

6. *Mugil belanak*, A. $\frac{3}{9}$, L. l. 34-35, L. tr. 10. Broad posterior eyelid. Head $5\frac{1}{4}$, height of body $5\frac{1}{2}$ in the total length. Eyes $4\frac{1}{2}$ in length of head, 1 diameter from end of snout. Extremity of maxilla visible. Anal commences slightly anterior to the second dorsal. No long axillary scale, 18 rows before dorsal fin, eleventh and twentieth scales of lateral-line correspond to origins of first and second dorsal fins.

7. *Mugil poicilus*, A. $\frac{3}{9}$, L. l. 30-33, L. tr. 10-11. Moderately wide posterior eyelid. Head $4\frac{3}{5}$ to 5, height of body 5 in the total length. Eyes $3\frac{1}{2}$ to $3\frac{3}{4}$ in length of head, 3/4 of a diameter from end of snout. Extremity of maxilla visible. Anal commences slightly anterior to second dorsal. No long axillary scale, 20 to 22 rows before dorsal fin, tenth and twentieth scales of lateral-line correspond to origins of first and second dorsal fins. Each scale with a black depressed spot in its centre, or else a dark band.

8. *Mugil Kelaartii*, A. $\frac{3}{9}$, L. l. 33, L. tr. 10. Broad posterior eyelid. Head 5, height of body $4\frac{1}{2}$ to 5 in the total length. Eyes 4 in length of head, nearly 1 diameter from end of snout. Extremity of maxilla visible. Anterior 1/3 of anal before origin of second dorsal. A long axillary scale, 19 rows before dorsal fin, tenth and twentieth scales of lateral-line correspond to origins of first and second dorsal fins.

9. *Mugil Jerdoni*, A. $\frac{3}{9}$, L. l. 31-32, L. tr. 10. Broad posterior eyelid. Head 5 to $5\frac{1}{2}$, height of body 5 in the total length. Eyes $3\frac{1}{2}$ in length of head, 1/2 a diameter from end of snout. Extremity of maxilla visible. Anterior 1/2 of anal before second dorsal. No elongated axillary scale, 18 rows before dorsal fin, tenth and nineteenth scales of lateral-line correspond to origins of first and second dorsal fins.

10. *Mugil Dussumieri*, A. $\frac{3}{9}$, L. l. 29-31, L. tr. 12. Broad posterior eyelid. Head 5 to $5\frac{1}{4}$, height of body $4\frac{1}{2}$ to 5 in the total length. Eyes 4 to $4\frac{1}{4}$ in length of head, 3/4 to 1 diameter from end of snout. Teeth in upper jaw. Extremity of maxilla visible. Anterior 1/2 of anal before origin of second dorsal. No long axillary scale, 18 rows before dorsal fin, ninth and twentieth scales of lateral-line correspond to origins of first and second dorsal fins.

11. *Mugil subviridis*, A. $\frac{3}{9}$, L. l. 30, L. tr. 11. Broad posterior eyelid. Head 5, height of body $4\frac{3}{4}$ in the total length. Eyes 4 in length of head, 3/4 of a diameter from end of snout. No teeth in jaws. Extremity of maxilla visible. Anterior 1/2 of anal before origin of second dorsal. No long axillary scale, 20 rows before dorsal fin, tenth and twentieth scales of lateral-line correspond to origins of first and second dorsal fins.

12. *Mugil oeur*, A. $\frac{3}{8}$, L. l. 42-44, L. tr. 14. Broad anterior and posterior eyelids. Head $4\frac{1}{2}$ to $4\frac{2}{3}$, height of body $5\frac{1}{3}$ to $5\frac{2}{3}$ in the total length. Eyes $4\frac{2}{3}$ in length of head, 1 diameter from end of snout. Extremity of maxilla scarcely visible. Anal commences opposite origin of second dorsal. A long axillary scale, 23 rows before dorsal fin, twelfth and twenty-fifth scales of the lateral-line correspond to origins of first and second dorsal fins. An oblique blue band over the base of the pectoral fin.

B. *No adipose eyelids.*

13. *Mugil corsula*, A. $\frac{3}{9}$, L. l. 48-52, L. tr. 15. Head $4\frac{1}{2}$ to $4\frac{3}{4}$, height of body 6 to $6\frac{1}{2}$ in the total length. Eyes elevated, 1/7 in length of head, 1 diameter from end of snout. Extremity of maxilla visible. Anal about 1/2 in front of origin of second dorsal. No long axillary scale, 28 rows before dorsal fin, sixteenth and thirty-fourth rows of the lateral-line correspond to the origins of first and second dorsal fins. Ascends rivers.

14. *Mugil Hamiltonii*, A. $\frac{3}{9}$, L. l. 44, L. tr. 18. Head $4\frac{1}{4}$ to $4\frac{1}{2}$, height of body $4\frac{1}{2}$ to 5 in the total length. Eyes $3\frac{1}{2}$ to 4 in length of head, 1 diameter from end of snout. Opercle with a spine. Extremity of maxilla visible. Anal with its first third before the origin of the second dorsal. No long axillary scale, 34 rows before dorsal fin, seventeenth scale of the lateral-line corresponds to the origin of the first dorsal fin. Fresh waters of Burma.

15. *Mugil seheli*, A. $\frac{3}{9}$, L. l. 42-43, L. tr. 13-14. Head $4\frac{2}{3}$ to 5, height of body $4\frac{2}{3}$ to $5\frac{1}{2}$ in the total length. Eyes $3\frac{1}{2}$ to 4 in length of head, 1/2 a diameter from end of snout. Extremity of maxilla usually concealed. Anal commences slightly before the second dorsal. A long axillary scale, 21 or 22 rows before the dorsal fin, twelfth and twenty-fourth scales of lateral-line correspond to the origins of first and second dorsal fins.

16. *Mugil crenilabris*, A. $\frac{3}{9}$, L. l. 41, L. tr. 13. Head $4\frac{2}{3}$ to 5, height of body $4\frac{2}{3}$ to 5 in the total length. Eyes $3\frac{1}{2}$ in length of head, 3/4 of a diameter from end of snout. Lips thick, crenulated. Anal commences opposite the second dorsal. No long axillary scale, 20 rows before dorsal fin, thirteenth and twenty-fourth scales of lateral-line correspond to origins of first and second dorsal fins. A black spot in axilla.

17. *Mugil cascasia*, A. $\frac{3}{8-9}$, L. l. 36-39, L. tr. 16-18. Head $4\frac{1}{2}$, height of body $4\frac{1}{2}$ to $5\frac{1}{4}$ in the total length. Eyes $3\frac{1}{2}$ to 4 in length of head, 3/4 to 1 diameter from end of snout. Anal commences under origin of second dorsal. No long axillary scale, 16 rows before dorsal fin, seventh and twenty-fourth scales of lateral-line correspond to origins of first and second dorsal fins. Rivers of Eastern Bengal, and N. W. Provinces, also Assam.

18. *Mugil cœruleo-maculatus*, A. $\frac{3}{9}$, L. l. 38, L. tr. 12. Head 5 to $5\frac{2}{3}$, height of body $4\frac{1}{4}$ to $4\frac{2}{3}$ in the total length. Eyes 4 in length of head, 1 diameter from end of snout. Anal commences under origin of second dorsal. A long axillary scale, 21 rows before dorsal fin, twelfth and twenty-fourth of lateral-line correspond to origins of first and second dorsal fins. A dark axillary spot.

19. *Mugil amarulus*, A. $\frac{3}{9}$, L. l. 36, L. tr. 12. Head $4\frac{1}{4}$, height of body $4\frac{1}{4}$ in the total length. Eyes 4 in length of head, 1 diameter from end of snout. Anal commences slightly in advance of second dorsal. No long axillary scale, 18 rows before dorsal fin, eleventh and twenty-fourth of lateral-line correspond to origins of first and second dorsal fins.

20. *Mugil labiosus*, A. $\frac{3}{9}$, L. l. 36, L. tr. 11-12. Head $4\frac{1}{2}$ to 5, height of body $4\frac{1}{3}$ in the total length. Eyes 3 in length of head, 3/4 of a diameter from end of snout. Lips thick, crenulated along their free edges. Anal with its first half before the second dorsal. No elongated scale in axilla, twelfth and twenty-fourth of lateral-line correspond to origins of first and second dorsal fins. A dark spot at base of pectoral fin.

21. *Mugil Borneensis*, A. $\frac{3}{9}$, L. l. 34, L. tr. 11. Head $4\frac{2}{3}$, height of body $4\frac{1}{2}$ to $4\frac{3}{4}$ in the total length. Eyes $3\frac{1}{2}$ to 4 in the length of head, 1 diameter from end of snout. Anterior third of anal before origin of second dorsal. A short angular scale in axilla, 21 rows before dorsal fin, eleventh and twenty-third of lateral-line correspond to the origins of the first and second dorsal fins.

22. *Mugil olivaceus*, A. $\frac{3}{9}$, L. l. 34, L. tr. 11. Head $5\frac{1}{4}$, height of body $4\frac{2}{3}$ in the total length. Eyes 4 in length of head, nearly 1 diameter from end of snout. Anterior 3/4 of anal before origin of second dorsal. A short angular scale in axilla, 21 rows before dorsal fin, eleventh and twenty-second of lateral-line correspond to origins of first and second dorsal fins.

23. *Mugil Buchanani*, A. $\frac{3}{9}$, L. l. 34-35, L. tr. 12. Head $4\frac{2}{3}$, height of body $4\frac{2}{3}$ in the total length. Eyes 4 in length of head, 3/4 of a diameter from end of snout. End of the maxilla not visible. Anal commences below the origin of the second dorsal. A short angular scale in axilla, 19 rows before dorsal fin, eighth and nineteenth scale of lateral-line correspond to the origins of the two dorsal fins. A dark axillary spot.

24. *Mugil Troschellii*, A. $\frac{3}{9}$, L. l. 31-33, L. tr. 11. Head $4\frac{2}{3}$ to 5, height of body $4\frac{2}{3}$ to 5 in the total length. Eyes $3\frac{1}{2}$ in length of head, 1 diameter from end of snout. Anterior third of anal before the origin of the second dorsal. A short angular scale in axilla, 18 or 19 rows before the dorsal fin, ninth and nineteenth rows of the lateral-line correspond to the origins of first and second dorsal fins. A darkish spot in axilla.

25. *Mugil oligolepis*, A. $\frac{3}{9}$, L. l. 26-28. Head $4\frac{2}{3}$, height of body $3\frac{2}{3}$ in the total length. Eyes $3\frac{1}{2}$ in length of head, 1 diameter from end of snout. First third of anal before the origin of the second dorsal. No elongated axillary scale, 17 rows before the dorsal fin, ninth and seventeenth scales of the lateral-line correspond to the origins of the first and second dorsal fins.

26. *Mugil Waigiensis*, A. $\frac{3}{8}$, L. l. 26-27. Head $4\frac{2}{3}$ to 5, height of body 5 to $5\frac{1}{4}$ in the total length. Eyes $4\frac{1}{4}$ to $4\frac{1}{2}$ in length of head, 1 to $1\frac{1}{4}$ diameters from end of snout. First third of anal before the origin of the second dorsal. No elongated axillary scale, 15 or 16 rows before the dorsal fin, eighth and seventeenth of the lateral-line correspond to the origins of the first and second dorsal fins. Most of the fins deep black.

1. **Mugil speigleri**, Plate LXXIV, fig. I.

Bleeker, Nat. Tijds. Ned. Ind. xvi, p. 279, and Act. Soc. Sc. Ned. Ind. vi, Borneo, xiii, p. 58; Günther, Catal. iii, p. 435.

? *Mugil axillaris*, Kner, Novara Fische, p. 227.

Mugil suppositus, Day, Fish. Malabar, p. 143 (not Günther).

B. vi, D. $4\frac{1}{8}$, P. 16, V. 1/5, A. $\frac{3}{9}$, C. 14, L. l. 40-42, L. tr. 11-12, Cæc. pyl. vi.

Length of head $4\frac{2}{3}$ to 5, of caudal $5\frac{1}{3}$, height of body $4\frac{3}{5}$ to 5 in the total length. *Eye*—with a broad posterior and a moderately wide anterior adipose lid, the former covering two-thirds of the width of the iris, diameter of eye 2/7 of length of head, 3/4 of a diameter from end of snout, and $1\frac{3}{4}$ apart. The width of the head equals 2/3 of its length. Interorbital space rather convex and equal to about half the length of the head. Preorbital scaled, curved, not emarginate and very finely serrated at its outer extremity: the end of the maxilla uncovered. The mandibles meet at an acute angle, are not notched, but end in a knob which is received into a corresponding depression in the upper jaw. Uncovered space below the chin long, narrow, and pointed. Upper lip rather thick, oblique, and forming part of the end of the snout: a deep transverse groove before the vomer. *Teeth*—a few minute ones in the lower jaw. *Fins*—dorsal spines weak, the fin commences midway between the base of the caudal fin and end of snout, or slightly nearer to the latter, its first spine strongest, equal to half the length of the head, but not quite so high as the second dorsal, which latter is emarginate superiorly and covered with fine scales, its base is nearly as long as its height. Pectoral situated above the centre of the depth of the body, and nearly or quite as long as the head. Ventral arises on a vertical line, midway between the bases of the pectoral and first dorsal fins. Anal rather higher than the second dorsal, its anterior fourth is vertically before that fin, its base is nearly as long as its anterior portion is high, its lower edge concave, third anal spine 1/3 the length of the head, and 1/4 longer than the second. Caudal lunated. *Scales*—cycloid, rounded posteriorly, many fine ones over soft dorsal, anal, and basal half of the caudal fins. A long, pointed, axillary scale, one also at first dorsal and ventral, 22 rows between snout and base of first dorsal fin, the first and second dorsals arise above the twelfth and twenty-fifth scales of the lateral-line. Free portion of the tail in its least depth equals half the length of the head. *Colours*—grayish along the back, silvery in the lower two-thirds of the body, sides of the head golden: tips of both dorsals blackish: extremity of caudal gray: a dark spot at the upper edge of the base of the pectoral.

Habitat.—Seas of India to the Malay Archipelago. The specimen figured (life-size) is from Bombay.

2. Mugil cunnesius, Plate LXXIV, fig. 3.

Mugil kunnesee, Russell, Fish. Vizag. ii, p. 65, pl. 181.
Mugil cunnesius, Cuv. and Val. xi, p. 114 (? Rüpp. N. W. Fische, p. 131); (Cantor, Catal. p. 100, not syn.); Bleeker, Banka, p. 454, and Sumatra, p. 8; (Günther, Catal. iii, p. 434, not syn.).
? *Mugil squamipinnis*, Swainson, Fishes, ii, p. 414.
Mugil longimanus, Günther, Catal. iii, p. 428.
Mugil engeli, Day, Fish. Malabar, p. 139 (not Bleeker).

B. vi, D. 4 | $\frac{1}{8}$, P. 16, V. 1/5, A. $\frac{3}{9}$, C. 14, L. l. 33-35, L. tr. 12.

Length of head $5\frac{1}{4}$ to $5\frac{1}{2}$, of caudal $5\frac{1}{2}$, height of body $4\frac{1}{2}$ in the total length. *Eye*—with a broad posterior adipose lid reaching 2/3 across the iris, also a narrow anterior one, diameter 2/7 to 1/4 of length of head, 2/3 of a diameter from end of snout, and $1\frac{1}{2}$ apart. Width of head equals its length behind the front edge or middle of the eye, and its height is about the same. Preorbital bent not notched, finely serrated inferiorly and denticulated at its extremity, the end of the maxilla is entirely concealed or just visible, the depth of the cleft of the mouth equals half the width of the gape. Mandibles meet at an acute angle, where they are notched, upper lip thin and placed obliquely so that it does not form a portion of the end of the snout. Uncovered space below the chin narrow and lanceolate. *Teeth*—minute in both jaws. *Fins*—first dorsal commences rather nearer the snout than the base of the caudal, its spines are moderately strong and equal the length of the head behind the middle of the eyes, but are not quite so high as the second dorsal fin. Second dorsal commences over the commencement of the second-third of the anal, the length of its base equals 2/3 of its height. Pectoral arises above the middle of the depth of the body and is as long as the head. Anal as high as the second dorsal, and 1/4 higher than long at its base, third anal spine nearly half as long as the head. Caudal lunated. *Scales*—18 rows between the snout and base of first dorsal fin, the tenth and twentieth of the lateral-line correspond with the origins of the two dorsal fins. Scales on preorbital, second dorsal, anal, and caudal fins: an elongated axillary scale well-developed. The least depth of the free portion of the tail equals 4/7 of the length of the head. *Colours*—silvery, darkest above, with a dark spot in the axilla.

I have specimens from Orissa slightly differing in that the eye is 1 diameter from the end of snout, and the upper lip forms the end of the profile.

Habitat.—Red Sea, seas of India, to the Malay Archipelago and beyond. The one figured (life-size) is from Bombay. It attains a large size.

3. Mugil carinatus, Plate LXXIV, fig. 2.

(Ehrenb.) Cuv. and Val. xi, p. 148; Day, Fish. Malabar, p. 145.

B. vi, D. 4 | $\frac{1}{8}$, P. 15, V. 1/5, A. $\frac{3}{9}$, C. 14, L. l. 34-36, L. tr. 11.

Length of head $4\frac{1}{4}$ to $4\frac{1}{2}$, of caudal $4\frac{3}{4}$ to $5\frac{1}{2}$, height of body 5 to $5\frac{1}{4}$ in the total length. *Eye*—with a broad posterior adipose lid nearly reaching the pupil, and a narrower anterior one, diameter $4\frac{1}{4}$ in the length of head, 1 diameter from end of snout, and $1\frac{1}{2}$ apart: the interorbital space nearly flat and equal to nearly 1/3 of the length of the head. Width of head equals its length behind the eye. Preorbital scaleless, moderately bent and serrated along the last portion of its inferior and hind edges, the end of the maxilla uncovered. Ends of the mandibles form an acute angle which is unnotched, and inferiorly having the origin of a large gland on either side: uncovered space below the chin of moderate width, rather rounded anteriorly and pointed posteriorly. Upper lip rather thick and forms the end of the snout. A transverse groove before the vomer. *Teeth*—distinct in the upper jaw, none in the lower. *Fins*—dorsal spines weak, and of about equal strength, the fin commences very slightly nearer the snout than the base of the caudal fin, the first dorsal spine equals the length of the head behind the eye, and is one-third higher than the second dorsal fin, which latter is emarginate and one-third higher than long at its base. Pectoral as long as the head behind the middle of the eye. Ventral arises on a vertical line midway between the bases of the pectoral and first dorsal fins. Anal as high as the spinous dorsal and 1/3 higher than long at its base, it commences slightly before that fin: third anal spine 2/7 of the length of the head and 1/4 longer than the second. Caudal lunated. *Scales*—24 or 25 rows between the first dorsal fin and the snout, the first and second dorsal fins arise above the ninth and twenty-first scales of the lateral line: some fine ones over the front portion of the soft dorsal and anal fins, no enlarged one in the axilla. The scales from the base of the first dorsal fin to the occiput form a short of keeled ridge. Free portion of the tail equal to 2/5 of the length of the head. *Colours*—grayish above, silvery on the sides and below, cheeks golden, numerous fine black spots on the head, both dorsals and caudal fins, base of pectoral also with some spots.

In one of the type specimens the length of the caudal fin is $4\frac{1}{4}$, height of body $4\frac{1}{4}$ in the total length.

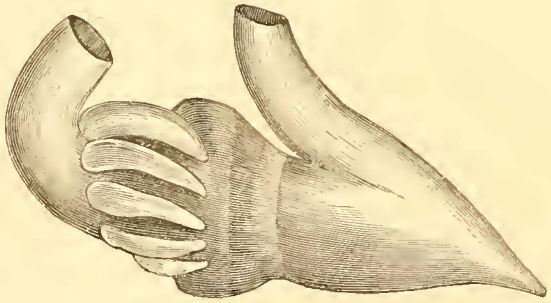
Habitat.—Red Sea and seas of India. The one figured (life-size) is from Bombay.

4. Mugil planiceps.

Mugil cephalus ? Ham. Buch. Fish. Ganges, pp. 219, 381.
Mugil planiceps, Cuv. and Val. xi, p. 122; Bleeker, Beng. en Hind. p. 101; Günther, Catal. iii, p. 428; Kner, Novara Fische, p. 225.
Mugil cephalotus, Cantor, Catal. p. 95.
Mugil Dussumieri, Bleeker, Java, iv, p. 339.
Bangon, Beng.

B. vi, D. 4 | $\frac{1}{8}$, P. 17, V. 1/5, A. $\frac{3}{9}$, C. 17, L. l. 33-35, L. tr. 11, Cæc. pyl. v.

Length of head $4\frac{1}{2}$ to 5, of caudal $5\frac{1}{2}$, height of body $5\frac{1}{2}$ to 6 in the total length. *Eye*—with a wide posterior adipose lid almost extending to the pupil, and a narrow anterior one, diameter $6\frac{1}{2}$ to 7 in the length of the head, $1\frac{1}{2}$ diameters from end of snout, and nearly 3 apart. Interorbital space flat, and its width equal to a little more than half the length of the head excluding the snout. Height of head not so long as its postorbital portion, whilst its width equals its length behind the middle of the eyes, or even of its entire length in large specimens. Head flattened superiorly: the depth of the cleft of the mouth equals half the width of its gape. The upper lip forms the end of the snout. The end of the maxilla is not hidden by the preorbital, which last is bent but not notched, serrated along its lower and posterior borders. Uncovered space on chin long, cuneiform above, pointed behind. *Teeth*—in the upper jaw minute. *Fins*—dorsal spines strong, the fin commences midway between the front edge of the eye and the base of the caudal fin, its origin corresponds to the tenth scale of the lateral-line, the height of the spines is 2/3 of that of the body, and equal the height of the second dorsal. Pectoral extends to the eighth scale of the lateral-line, its root is in the middle of the depth of the body. The first three anal rays are on the vertical before the second dorsal fin. Caudal emarginate. *Scales*—20 rows between the snout and base of first dorsal fin: the tenth and twenty-first



Stomach and Cæcal Appendages, small Intestine turned upwards.

scales of the lateral-line correspond to the origin of the first and second dorsal fins: no enlarged axillary one: small ones present on the vertical fins. Cæcal appendages five, as shown in the woodcut. Free portion of the tail in its least depth equals $2\frac{1}{4}$ in the length of the head. *Colours*—greenish-brown superiorly, with a dark line along each row of scales.

Habitat.—Seas, estuaries, and tidal rivers of India to the Malay Archipelago and China. It attains at least a foot-and-a-half in length. It is common in the Hooghly at Calcutta.

5. Mugil parsia, Plate LXXV, fig. 2.

Ham. Buch. Fish. Ganges, pp. 215, 380, pl. xvii, f. 71; Cuv. and Val. vi, p. 144; (Bleeker, Nat. Tij. Ned. Ind. 1852, p. 166 not Syn.); Günther, Catal. iii, p. 426; Day, Fish. Malabar, p. 142.
Mugil Cantoris, Bleeker, Beng. en Hind. p. 100; Günther, Catal. iii, p. 430; (? Kner, Novara Fische, p. 225).
Tarui, Beng.

B. vi, D. 4 | $\frac{1}{8}$, P. 14, V. 1/5, A. $\frac{3}{8-9}$, C. 14, L. l. 34-35, L. tr. 11-12, Cæc. pyl. v.

Length of head 5 to $5\frac{1}{4}$, of caudal 6, height of body from $4\frac{1}{3}$ to $4\frac{1}{2}$ in the total length. *Eye*—with a well developed posterior adipose lid extending two-thirds of the distance across the iris, diameter of eyes 2/7 of length of the head, 3/4 of a diameter from end of snout, and $1\frac{1}{2}$ apart. Height of the head almost equals its length, its width equals its length behind anterior third of the eye. Upper surface of head slightly convex, snout rather depressed, upper lip thin and placed obliquely, so that only its central portion forms part of the end of the snout. Preorbital bent not notched, serrated, and does not quite conceal the end of the

maxilla. Mandibular angle somewhat obtuse, the cleft of the mouth equalling half the width of the gape Uncovered space on chin very narrow, lanceolate. A shallow groove before the vomer. *Teeth*—visible in the upper jaw. *Fins*—the first dorsal commences midway between the snout and the base of the caudal, its first two spines, which are not very strong, are of about the same length, and equal the length of head behind the posterior third of the orbit. Second dorsal 1/3 higher than its base is long, its origin is a little posterior to that of the anal. Pectoral as long as the head excluding the snout, and reaching to the eleventh or twelfth scale of the lateral-line, third anal spine 3/7 of the length of the head. *Scales*—each with distinct longitudinal lines, rather angular and slightly ctenoid, 21 or 22 rows between the snout and base of first dorsal fin; the eleventh and twenty-second scales of the lateral-line correspond to the origin of the first and second dorsal fins: no elongated axillary one, some fine ones over the second dorsal and anal fins. Free portion of the tail at its least depth equals the length of the head behind the middle of the eye. *Colours*—a golden spot on the upper portion of the opercles, sometimes dark in the axilla, a narrow dark edge to both dorsal fins, most distinct in the second: caudal with a yellowish base and dark extremity.

Habitat.—Seas and estuaries of India: attaining 5 or 6 inches in length. The one figured (life-size) is from the Hooghly at Calcutta.

6. Mugil belanak, Plate LXXIV, fig. 5.

Bleeker, Java, iv, p. 337; Günther, Catal. iii, p. 427.

B. vi, D. 4 | $\frac{1}{8}$, P. 15, V. 1/5, A. $\frac{3}{9}$, C. 16, L. l. 34-35, L. tr. 10.

Length of head $5\frac{1}{4}$, of caudal 6, height of body $5\frac{1}{2}$ in the total length. *Eye*—with a broad posterior eyelid which reaches half way across the iris, diameter of eye 2/9 of length of head, 1 diameter from end of snout, and 2 apart. Interorbital space slightly convex, and equal to $2\frac{1}{4}$ in the length of the head. Width of the head equals its length behind the middle of the eye, its height equals its width. Preorbital deeply notched, serrated both inferiorly and posteriorly, the end of the maxilla is uncovered. The mandibles meet at rather an acute angle, where they are notched: uncovered space at chin rapidly narrows posteriorly, rounded anteriorly. Upper lip of moderate thickness, its upper portion forms part of the end of the snout. A groove before the vomer. Cleft of mouth equals half of its width. *Teeth*—distinct in the upper jaw. *Fins*—dorsal spines strong, the fin arises midway between the end of the snout and the base of the caudal, its second spine the longest and equal to half the height of the body, but 1/4 shorter than the height of the second dorsal fin, which latter commences slightly behind the anterior origin of the anal, both densely scaled. Pectoral as long as the head behind the middle of the eye. Third anal spine equals 1/3 of the length of the head. *Scales*—18 rows between snout and origin of first dorsal fin: first and second dorsal fins arise respectively above the eleventh and twentieth scales of the lateral-line. No enlarged axillary scale. Free portion of tail equals the length of the head behind the middle of the eye. *Colours*—silvery, darkest along the back.

Habitat.—Seas of India to the Malay Archipelago. The specimen figured (life-size) is from Bombay.

7. Mugil poicilus, Plate LXXV, fig. 4.

Day, Proc. Zool. Soc. 1865, p. 33, and Fish. Malabar, p. 140, pl. ix.
Mugil cunnumboo, Day, Fish. Malabar, p. 141.

B. vi, D. 4 | $\frac{1}{8}$, P. 15, V. 1/5, A. $\frac{3}{9}$, C. 14, L. l. 30-33, L. tr. 10-11, Cæc. pyl. v.

Length of head $4\frac{3}{4}$ to 5, of pectoral 7, of caudal 5 to $5\frac{1}{2}$, height of body 5 in the total length. *Eye*—with a moderately broad posterior adipose lid and a narrow anterior one, diameter $3\frac{1}{2}$ to $3\frac{3}{4}$ in length of head, 3/4 of a diameter from end of snout, and $1\frac{1}{2}$ to $1\frac{3}{4}$ apart. Width of the head equals its height, and its length behind the middle of the eyes. Interorbital space nearly flat. The anterior portion of the snout is formed by the upper lip which is thin. The depth of the cleft of the mouth equals half the extent of the gape. Extremity of the maxilla not concealed by the preorbital which is scaled, angularly bent and serrated. Uncovered space on chin, elongated and tongue-shaped. A transverse groove in front of vomer. *Teeth*—fine ones in the upper jaw, minute in the lower. *Fins*—the first dorsal commences above the tenth scale of the lateral-line, has from 20 to 22 rows between it and the snout, and is somewhat nearer the base of the caudal than the end of the snout, its spines are strong, as long as the head behind the eyes, and 1/8 higher than the rays of the second dorsal. Second dorsal commences slightly behind the origin of the anal, above the twentieth scale of the lateral-line, and is one-third higher than long at its base. Caudal emarginate. *Scales*—slightly ctenoid, no elongated one in the axilla, or along the base of the first dorsal fin, fine ones over second dorsal, anal, and caudal fins. The least depth of the free portion of the tail equals the length of the head behind the eyes. *Colours*—grayish, shot with purple and silver, becoming lighter on the sides and below, each scale has usually a deep central black spot: fins stained with gray.

M. cunnumboo is the same fish, but without the black spots, having instead brownish stripes along each row of scales, it is the adult form, but in some of my specimens two-thirds grown, a very few black spots are apparent.

Habitat.—Bombay and the Western coast of India, more especially in the cold months. The one figured (life-size) is from Bombay. It attains at least 2 feet in length.

8. Mugil Kelaartii, Plate LXXV, fig. 1.

Günther, Catal. iii, p. 429.

B. vi, D. 4 | $\frac{1}{8}$, P. 15, V. 1/5, A. $\frac{3}{9}$, C. 17, L. l. 33, L. tr. 10.

Length of head 5, of caudal $5\frac{1}{4}$, height of body $4\frac{1}{2}$ to 5 in the total length. *Eye*—with a broad posterior adipose lid nearly reaching the pupil, and a narrow anterior one, diameter of eye 1/4 of length of head, nearly 1 diameter from end of snout, and $1\frac{2}{3}$ apart. The width of the head equals its length behind the middle of the eyes, and its height equals its length excluding the snout. Interorbital space convex and its width equals 3/7 of the length of the head. Profile from occiput to snout rather convex. Preorbital bent, having a slight notch, serrated inferiorly and posteriorly, and leaving the extremity of the bent maxilla visible. Upper lip rather thin, placed obliquely so that it does not form a portion of the anterior edge of the snout. Mandibles meet at a right angle, are notched at their extremity, and have a knob above the symphysis. The extent of the cleft equals half the width of the gape. Uncovered portion of the chin long, narrow, lanceolate, and constricted on either side about its middle. A shallow groove before the vomer. *Teeth*—minute in the lower jaw. *Fins*—first dorsal commences midway between the end of the snout and the base of the caudal, its spines are of moderate strength, equal 3/5 of the length of the head, and are nearly as high as the second dorsal. Length of the base of the second dorsal equals 2/3 of its height. Pectoral inserted above the middle of the depth of the body. Anal has its anterior 1/3 in advance of the origin of the second dorsal. Caudal emarginate, its central rays as long as the postorbital portion of the head. *Scales*—an elongated pointed one in the axilla: 19 rows of scales between the snout and base of the first dorsal fin, the tenth and twentieth of the lateral-line correspond to the origins of the first and second dorsal fins: second dorsal, anal, and caudal densely scaled. Free portion of the tail in its least depth corresponds to the length of the postorbital portion of the head. *Colours*—silvery, becoming lighter on the sides and beneath, a darkish spot in the axilla: tips of both dorsals and caudal dark.

Habitat.—Seas of India, Philippines. The one figured (life-size) is from Madras.

9. Mugil Jerdoni.

Mugil Sundanensis, Day, Fish. Malabar, p. 138 (not Bleeker).

B. vi, D. 4 | $\frac{1}{8}$, P. 16, V. 1/5, A. $\frac{3}{9}$, C. 15, L. l. 31-32, L. tr. 10.

Length of head 5 to $5\frac{1}{2}$, of caudal 5, height of body 5 in the total length. *Eye*—with a broad posterior adipose lid almost reaching to the pupil, and a narrow anterior one, diameter $3\frac{1}{2}$ in the length of head, 1/2 a diameter from end of snout, and $1\frac{1}{2}$ diameters apart. Interorbital space slightly convex, and its width equal to $2\frac{1}{4}$ in the length of the head. The height of the head equals its length behind the first third of the eye: its width is slightly less. Preorbital strongly bent and serrated, leaving the end of the bent maxilla visible. Mandibles meet at a somewhat obtuse angle, and are notched, the depth of the cleft of the mouth equals half the extent of its gape: uncovered space at chin narrow, rounded anteriorly, pointed posteriorly. Upper lip of moderate thickness, it forms the end of the snout in the median line. A slight groove in front of vomer. *Teeth*—distinct in the upper jaw. *Fins*—first dorsal commences slightly nearer to the snout than it does to the base of the caudal fin, its spines are stout, the longest equals 2/3 of the height of the body below them and are slightly higher than the second dorsal. Pectoral inserted above the middle of the depth of the body, and is as long as the head excluding the snout. The anal is of the same height as the second dorsal, its anterior 1/2 is before the origin of that fin, third anal spine from 3/7 to 2/5 of length of head. *Scales*—18 rows between the snout and base of first dorsal fin, the tenth and nineteenth correspond to the origins of the first and second dorsal fins. No elongated axillary scale: second dorsal, anal, and caudal densely scaled. Free portion of the tail in its least depth equals the length of the postorbital portion of the head. *Colours*—steel blue along the back, becoming silvery white on the sides and below. Cheeks tinged with yellow, a black spot over the centre of the eye. Both dorsals with their extremities rather stained with gray, caudal and pectoral dark edged: a rather indistinct spot of gray in the axil of the pectoral fin, sometimes a diffused dark-bluish spot on opercle: ventrals and anal white.

I have named this species after the late Dr. Jerdon, who both directly and indirectly assisted in clearing up many disputed facts in the Ichthyology of India.

This species is near *M. Kelaartii*, but has a larger eye and a different disposition of its second dorsal and anal fins, &c. *M. engeli* also appears to closely resemble it, but has an elongated axillary scale, dorsal spines slender.

Habitat.—Seas of India to at least 6 inches in length.

10. Mugil Dussumieri, Plate LXXIV, fig. 4.

Mugil albula ? Ham. Buch. Fish. Ganges, pp. 218, 380 (not Bonn.) and *M. lævis*, MSS.
Mugil Dussumieri, Cuv. and Val. xi, p. 147.
Mugil subviridis, Günther, Catal. iii, p. 423, (? Cuv. and Val.)
Mugil nepalensis, Günther, l. c. p. 424.

B. vi, D. 4 | $\frac{1}{8}$, P. 16, V. 1/5, A. $\frac{3}{9}$, C. 15, L. l. 29-31, L. tr. 12.

Length of head 5 to $5\frac{1}{4}$, of caudal $5\frac{1}{3}$, height of body $4\frac{1}{2}$ to 5 in the total length. *Eyes*—with a broad posterior and narrow anterior adipose lid, diameter of eye 4 to $4\frac{1}{4}$ in length of head, 3/4 to 1 diameter from end

of snout, and 2 apart. The greatest width of the head equals its height, or its length excluding the snout. The profile from the first dorsal fin to the snout nearly horizontal. Preorbital scaled, bent, emarginate, and denticulated both inferiorly and posteriorly: the end of the maxilla is not concealed. Upper lip moderately thin and forms a portion of the front end of the snout. The mandibles form an obtuse angle, the uncovered space on the chin is lanceolate: gape of mouth twice as broad as the cleft is deep. *Teeth*—distinct in the upper jaw. *Fins*—the first dorsal commences midway between the front edge of the eye and the base of the caudal fin, its spines are strong, the first the longest and strongest, equalling the length of the head behind the middle of the eye, and rather higher than the second dorsal. Pectoral inserted above the middle of the depth of the body, as long as the head excluding the snout, and reaching to the seventh scale of the lateral-line. Anal having its anterior half situated before the commencement of the second dorsal, its third spine equals 3/8 of the length of the head, and is 1/4 longer than the second. Caudal emarginate. *Scales*—their exposed portion angular, no enlarged elongated one in the axilla, but one at the first dorsal and ventral fins: 18 rows of scales between the snout and the base of the first dorsal fin: the ninth and twentieth scales of the lateral-line correspond to the origins of the first and second dorsal fins: second dorsal, anal, and caudal densely scaled. Free portion of the tail in its lowest portion equalling 2/3 of the length of the head. *Colours*—dull greenish superiorly, becoming lighter on the sides and beneath: outer edge of caudal dark.

Hamilton Buchanan has left a MS. figure of this species, which is closely allied to, if not identical with, *M. subviridis*, C. V.: the latter however has no teeth in the jaws in the typical specimen which is at Paris.

Habitat.—Seas of India, entering fresh water. The specimen figured is from the Hooghly at Calcutta.

11. Mugil subviridis.

Cuv. and Val. xi, p. 115; Day, Fish. Malabar, p. 138.

B. vi, D. 4 | $\frac{1}{8}$, P. 16, V. 1/5, A. $\frac{3}{9}$, C. 15, L. l. 30, L. tr. 11.

Length of head 5, of caudal $6\frac{1}{2}$, height of body $4\frac{3}{4}$ in the total length. *Eye*—with a broad posterior and narrow anterior adipose lid, diameter of eye 1/4 of length of head, 3/4 of a diameter from end of snout, and $1\frac{3}{4}$ apart. Preorbital strongly bent and serrated, the end of the maxilla visible. Uncovered space below the chin narrow and lanceolate. *Teeth*—absent. *Fins*—20 rows of scales between the snout and first dorsal fin. Pectoral reaches to the seventh scale of the lateral-line. *Scales*—exposed portion angular, tenth and twentieth scales of lateral-line correspond to the origins of first and second dorsal fins. Second dorsal and anal densely scaled. No elongated ax llary scale. *Colours*—as in *M. Dussumieri.*

Habitat.—The type specimen of Cuv. and Val. described above was from the Ganges.

12. Mugil oeur, Plate LXXV, fig. 3.

Mugil öûr, Forsk. p. 74 (109, c.); Rüppell, N. W. Fische, p. 131.

Mugil cephalus, Russell, Fish. Vizag. ii, p. 64, and *Bontah*, pl. 180.

Mugil cephalotus, Cuv. and Val. xi, p. 110; Cantor, Ann. and Mag. Nat. Hist. ix, 1842, p. 484 (not Catal. Malay. Fish.); Eyd. and Soul. Voy. Bonite, Zool. i, p. 175, pl. 4, f. 4; Günther, Catal. iii, p. 419; Kner, Novara Fische, p. 224 (Bleeker, Fish. Madagas. p. 45, t. 2, f. 1, not synon.).

Mugil Japonicus, Tem. and Schleg. Fauna Japon. p. 134, pl. 72, f. 1; Richards. Ich. China, p. 247; Bleeker, Japan, p. 41.

Mugil macrolepidotus, Richards. Ich. China, p. 249.

Mugil bontah, Bleeker, Beng. en Hind. p. 48.

Mugil cunnesius, Day, Fish. Malabar, p. 136, (not Cuv. and Val.).

Mugil oeur, Klunz. Verh. z. b. Ges. Wien, 1370, p. 829.

B. vi, D. 4 | $\frac{1}{8}$, P. 15, V. 1/5, A. $\frac{3}{8}$, C. 15, L. l. 42-44, L. tr. 14.

Length of head $4\frac{1}{2}$ to $4\frac{2}{3}$, of caudal $4\frac{3}{4}$, height of body $5\frac{1}{3}$ to $5\frac{2}{3}$ in the total length. *Eyes*—with broad anterior and posterior adipose lids, both of which reach the pupil, diameter $4\frac{2}{3}$ in length of head, 1 diameter from end of snout, and $2\frac{1}{3}$ apart. Interorbital space flat and its width equal to half the length of the head: the dorsal profile from the snout to the base of the first dorsal fin is nearly horizontal. The greatest width of the head equals its length behind the middle of the eyes. Preorbital scaled, neither notched nor bent, its lower and posterior edges serrated, the maxilla only visible as a narrow strip or even quite concealed. Upper lip thin, and in the mesial line forms the front end of the snout. The mandibles join at a right angle, are notched at their point of junction and have two small open glands beneath them. Uncovered space on chin rather broad and rounded anteriorly, narrow and lanceolate posteriorly. The extent of the cleft of the mouth is a little more than half the width of its gape. *Teeth*—distinct in both jaws. *Fins*—the first and second dorsal fins commence above the twelfth and twenty-fifth scales of the lateral-line. The origin of the first dorsal is midway between the end of the snout and the base of the caudal, its spines are rather strong, the first is as long as the head behind the eye, and slightly exceeds the height of the second dorsal, the extent of the base of which last fin equals three-fourths of its height. Pectoral situated above the middle of the depth of the body, as long as the head behind the eye and extending to the eleventh scale of the lateral-line. Anal arises opposite the second dorsal, is of equal height, but its base is slightly longer, both fins are emarginate. Caudal with pointed lobes. *Scales*—rounded, a rather large pointed axillary one and another along the base cf the first

dorsal. About 23 rows of scales between the snout and origin of the first dorsal fin: few or none on second dorsal and anal fins. Free portion of the tail, in its least depth, equal to $2\frac{1}{3}$ in the length of the head. *Colours*—grayish along the back, becoming silvery on the sides and beneath, a dark line along each row of scales in the upper half of the body. Cheeks golden. Pectoral fin with an oblique, deep blue band across its base, having its outer third dark with a light margin. Second dorsal and caudal gray: anal yellowish with a dark mark along its centre, and a light edge. Some specimens have a black edge to caudal fin and appear very similar to *M. Borbonicus*, C. V.,* height of body $4\frac{3}{4}$ in the total length.

This species is identical with *M. cephalotus*, C. V., which was identified with Forskal's *M. oeur.* I have obtained it along the Meckrau coast.

The season for capturing these fishes along the western coast of India commences about the middle of November, when they swarm close inshore in order to enter estuaries and the mouths of large rivers to deposit their ova, they continue very numerous until about February. Their roes are collected and dried in the sun with or without the use of salt.

Habitat.—Red Sea, seas of India to China and Japan. It attains at least 3 feet in length. The specimen figured (life-size) is from Bombay.

B. *No adipose eyelids.*

13. **Mugil corsula**, Plate LXXI, fig. 6.

Ham. Buch. Fish. Ganges, pp. 221, 381, pl. 9, f. 97; Cuv. and Val. xi, p. 119; Bleeker, Beng. en Hind. p. 101; Eyd. and Soul. Voy. Bonite, Zool. i, p. 172, pl. 4, f. 2; Günther, Catal. iii, p. 460.

Kakunda, Ooriah; *Hurd-wah-re*, Punj.; *Corsula* and *In-ge-lee*, Beng.; *Undula*, Hind.; *Nga-zen*, Burma.

B. vi, D. 4 | $\frac{1}{7-8}$, P. 15, V. 1/5, A. $\frac{3}{9}$, C. 15, L. l. 48-52, L. tr. 15, Cæc. pyl. ii.

Length of head $4\frac{1}{2}$ to $4\frac{3}{4}$, of pectoral $5\frac{1}{2}$, of caudal 6, height of body 6 to $6\frac{1}{2}$ in the total length. *Eyes*—without adipose lids, elevated, their upper margin being above the level of the flat, interorbital space, diameter 1/7 of length of head, 1 diameter from end of snout, and 1 to $1\frac{1}{2}$ apart. Greatest width of the head equals its postorbital length and its height equals a little more. Head depressed, dorsal profile nearly horizontal. Mouth angular, the upper jaw the longer and overhung by the snout. Preorbital not notched, serrated, and does not conceal the end of the maxilla which reaches to below the middle of the eye. Upper lip thick. *Teeth*—a single row of fine ones in either jaw. *Fins*—the first dorsal commences above the sixteenth scale of the lateral-line and somewhat nearer to the base of the caudal than the end of the snout, it has about 28 rows of scales between it and the snout, its spines are about 1/2 as long as the head excluding the snout. The second dorsal arises above the thirty-fourth scale of the lateral-line: anal with its first seven rays anterior to the second dorsal. Caudal slightly emarginate. *Scales*—finely ctenoid, with a slightly raised line along the centre of each: a few on the second dorsal, anal, and caudal fins. No elongated axillary scale. *Colours*—dull brown superiorly, becoming lighter along the abdomen, dorsal and caudal fins stained with gray. Eyes of a golden colour. Peritoneum black.

These fish swim with their eyes just above the surface of the water, giving the appearance of a number of tadpoles. Immediately they are disturbed they dive down with great rapidity.

Habitat.—Rivers and estuaries of Bengal and Burma, found far above tidal influence in the fresh water. It attains a foot-and-a-half or more in length, and is excellent eating. The one figured (life-size) is from Calcutta.

14. **Mugil Hamiltonii**, Plate LXXV, fig. 5.

Day, Proc. Zool. Soc. 1869, p. 614.

B. vi, D. 4 | $\frac{1}{8}$, P. 13, V. 1/5, A. $\frac{3}{9}$, C. 15, L. l. 44, L. tr. 18.

Length of head $4\frac{1}{4}$ to $4\frac{1}{2}$, of caudal 5, height of body $4\frac{1}{2}$ to 5 in the total length. *Eyes*—without adipose lids, diameter 2/7 to 1/4 of length of head, 1 diameter from end of snout, and $1\frac{1}{3}$ apart. Height of head equals its length excluding the snout, its width equals rather more than its postorbital length. Interorbital space slightly convex, its width equal to one-third of the length of the head. Mouth rather wide, its cleft equal to half its gape, the mandibular angle somewhat obtuse. Lips rather thin, the upper forming the end of the snout: the maxilla bent but not quite concealed by the preorbital, which latter is not notched but strongly denticulated, with from 10 to 16 strong teeth, the five at its posterior edge being almost spinate. The distance between the nostrils equals half a diameter of the orbit. Uncovered space on chin very narrow and lanceolate. Opercle with a strong spine. *Teeth*—none visible. *Fins*—the first dorsal arises midway between the anterior edge of the eye and the base of the caudal fin, above the seventeenth scale of the lateral-line, its longest spine equals the distance between the middle of the eye and the end of the opercle: second dorsal as high as the first, it commences over the anterior third of the anal. Pectoral as long as the head excluding the snout. Caudal rather deeply lunated. *Scales*—no enlarged one in axilla, they are strongly ctenoid, with a raised line along each: 34 rows between the snout and base of first dorsal fin: some large ones along the base of the first dorsal:

* *M. Borbonicus*, C. V., has L. l. 42, L. tr. 15, the dorsals arise as in *M. oeur*, but the height of the body is $4\frac{1}{2}$ in the total length, and the second dorsal is rather higher than the first.

a few on the vertical fins. The least depth of the free portion of the tail equals half the length of the head. *Colours*—silvery, shot with gold, of a leaden colour along the upper half of the body.

Habitat.—Rivers of Burma to about $4\frac{1}{2}$ inches in length.

15. Mugil seheli.

Forsk. p. 73; Cuv. and Val. xi, p. 148; Klunz. Verh. z. b. Ges. Wien, 1870, p. 827.

Mugil axillaris, Cuv. and Val. p. 131; Bleeker, Sumatra, ix, p. 3; Günther, Catal. iii, p. 441; Day, Fish. Orissa. P. Z. S. 1869, p. 300.

? *Mugil cylindricus*, Cuv. and Val. xi, p. 132; Bleeker, Sumatra, ii, p. 266.

Mugil parsia, Bleeker, Nat. Tijd. Ned. Ind. iii, 1852, p. 166, (not Ham. Buch.).

Magi, Ooriah.

B. vi, D. 4 | $\frac{1}{8}$, P. 15, V. 1/5, A. $\frac{3}{9}$, C. 16, L. l. 42-43, L. tr. 13-14.

Length of head $4\frac{2}{3}$ to 5 ($6\frac{1}{5}$), of caudal $5\frac{1}{2}$, height of body $4\frac{2}{3}$ to $5\frac{1}{2}$ in the total length. *Eyes*—without adipose lids, diameter $3\frac{1}{2}$ to 4 in the length of head, 1/2 a diameter from end of snout, and $1\frac{1}{2}$ to 2 diameters apart. The width of the head equals its length behind the first third of the eye, its height equals it length excluding the snout. Preorbital scarcely emarginate, denticulated at its extremity: the end of the maxilla visible, sometimes concealed: upper lip forms the end of the snout. *Fins*—the first dorsal commences midway between the snout and the base of the caudal fin, it is not quite so high as the second, which last is a little lower than the anal. Pectoral nearly as long as the head. Anal commences slightly before the second dorsal. Caudal emarginate. *Scales*—21 or 22 between the snout and base of first dorsal fin, the twelfth and twenty-fourth scales of the lateral-line correspond to the origins of the first and second dorsal fins, soft dorsal and anal scaly. A long axillary scale. Free portion of the tail in its least depth equals 1/2 the length of the head. *Colours*—silvery, with a bluish-green tinge along the head and back: a black mark in the axilla. Ventrals white.

Habitat.—From the Red Sea through those of India to the Malay Archipelago. It attains at least a foot in length.

16. Mugil crenilabris.

Forsk. Desc. An. p. 73; Cuv. and Val. xi, p. 123; Rüpp. N. W. Fische, p. 132; Günther, Catal. iii, p. 458; Kner, Novara Fische, p. 228; Klunz. Verh. z. b. Ges. Wien, 1870, p. 826.

B. vi, D. 4 | $\frac{1}{8}$, P. 17, V. 1/5, A. $\frac{3}{9}$, C. 16, L. l. 41, L. tr. 13.

Length of head $4\frac{2}{3}$ to 5, of caudal $5\frac{1}{2}$, height of body $4\frac{2}{3}$ to 5 in the total length. *Eyes*—without adipose lids, diameter $3\frac{1}{2}$ in length of head, 3/4 of a diameter from end of snout, and $1\frac{3}{4}$ apart. Profile from upper edge of snout to base of first dorsal fin nearly horizontal: snout obtuse, projecting beyond the mouth. Preorbital bent, not notched, serrated posteriorly: the end of the maxilla just visible. Upper lip very thick, forming the end of the snout, and having about five rows of soft tubercles along its lower fourth, the inferior of which are branched at their extremities: lower lip thick, reflected, deficient opposite the notched symphysis, it is thickly studded with tubercles along its upper exposed surface. Mandibles meet at rather an obtuse angle. Free space beneath the chin narrow. *Teeth*—none visible. *Fins*—first dorsal commences midway between the front edge of the eye and the base of the caudal fin, its spines are not strong, as long as the postorbital length of the head and 3/4 the height of the second dorsal. The length of the base of the second dorsal equals 2/3 of its height. Pectoral nearly as long as the head, it reaches to the fifteenth scale of the lateral-line and is inserted above the middle of the depth of the body. Anal arises opposite the second dorsal, the length of its base equals 2/3 of its height, which latter equals that of the second dorsal. Caudal deeply forked, its central rays equal the length of the head behind the last third of the eye. *Scales*—20 rows between the snout and base of the first dorsal: thirteenth and twenty-fourth scales of the lateral-line correspond to the origins of the first and second dorsal fins: second dorsal, anal, and base of caudal scaled. No enlarged axillary scale. Free portion of the tail as long as the head behind the last third of the eye. *Colours*—greenish-brown along the back, becoming dull white on the sides and below. A black spot superiorly at the base of the pectoral.

Habitat.—Red Sea to the Andamans and Nicobars. I captured one specimen $4\frac{1}{2}$ inches in length at the Andamans.*

17. Mugil cascasia, Plate LXXV, fig. 6.

Ham. Buch. Fish. Ganges, pp. 217, 380; Cuv. and Val. xi, p. 145.

Cuck-se or *Buah*, Punj.

B. vi, D. 4 | $\frac{1}{8}$, P. 15, V. 1/5, A. $\frac{3}{8-9}$, C. 14, L. l. 36-39, L. tr. 16-18, Cæc. pyl. ii (short).

Length of head $4\frac{1}{2}$, of caudal $5\frac{1}{2}$ to 6, height of body $4\frac{1}{2}$ to $5\frac{1}{4}$ in the total length. *Eyes*—without adipose lids, diameter $3\frac{1}{2}$ to 4 in length of head, 3/4 to 1 diameter from end of snout, and $1\frac{1}{2}$ apart. Head flattened superiorly, its greatest width equals its length behind the middle of the eyes, its height equals its length excluding the snout, and the width of the interorbital space $2\frac{1}{2}$ in the length of the head. Mouth wide, its cleft

* In my paper on the Fishes of the Andaman islands, P. Z. S. 1870, p. 685, for *Mugil macrochilus*, Bleeker, *M. labiosus* and *M. crenilabris*, should be substituted, the remarks respecting them as food belong to *M. cœruleo-maculatus*.

being only one third of the extent of its gape : the mandibular angle very obtuse. Upper lip placed obliquely so that it does not form a part of the front of the snout. The end of the maxilla is partially concealed by the preorbital, which is large, slightly bent, serrated along its lower margin and with three spinate denticulations at its posterior extremity. Opercle with a strong spine. Uncovered space on chin somewhat lanceolate. *Teeth*—minute, but present in both jaws. *Fins*—the first dorsal commences much nearer to the snout than to the base of the caudal fin, its origin is above the seventh scale of the lateral-line, there are 16 rows between it and the snout, its second spine the longest, equalling the length of the head excluding the snout and 1/3 higher than the second dorsal. The second dorsal arises above the twenty-fourth scale of the lateral-line and opposite the anal, the third anal spine equals 3/7 of the length of the head. Pectoral as long as the head excluding the snout, situated in the middle of the depth of the body, and having a short, angular, somewhat large but not elongated axillary scale. Caudal lunated. *Scales*—very strongly ctenoid, having a slightly raised line along each : a few over the bases of the vertical fins. The least depth of the free portion of the tail equals half the length of the head. *Colours*—yellowish olive along the top of the head, grayish on the back and upper third of the side, and with many fine black dots, silvery white in its lower two-thirds. Uncovered space on chin, eyes, base of pectoral, and centre of base of caudal, gamboge yellow : cheeks silvery : fins uncoloured.

Habitat.—Upper waters of Ganges and Jumna rivers, and certainly as low down as Patna : also in the Brahmapootra. It does not appear to exceed 4 inches in length, and is considered very bad eating. The specimen figured (life-size) is from Delhi.

18. Mugil cœruleo-maculatus.

Lacép. v, pp. 385, 389; Cuv. and Val. xi, p. 128; Bleeker, Riouw. p. 484, and Sumatra, ix, p. 5; Günther, Catal. iii, p. 445.

B. vi, D. 4 | $\frac{1}{8}$, P. 17, V. 1/5, A. $\frac{3}{9}$, C. 14, L. l. 38, L. tr. 12.

Length of head 5 to $5\frac{2}{3}$, of caudal 5, height of body $4\frac{1}{4}$ to $4\frac{2}{3}$ in the total length. *Eyes*—without adipose lids, diameter 1/4 of length of head, nearly 1 diameter from end of snout, and 2 apart. Interorbital space slightly convex, its width about equalling 1/2 the length of the head. Width of the head equals its length excluding the snout, its height equals its width. Upper lip thick, placed obliquely so that it does not form a part of the front end of the snout. Preorbital not notched, serrated posteriorly, maxilla hidden. Uncovered portion of chin very narrow. *Teeth*—minute. *Fins*—first dorsal commences midway between the snout and the base of the caudal, its spines are stout, not quite so high as the second dorsal, but equalling the length of the postorbital portion of the head : second dorsal commences opposite the anal, they are of equal height and scaled. Pectoral as long as the head excluding the snout. Caudal lunated, its central rays more than half the length of the longest outer ones. *Scales*—cycloid, 21 rows between the snout and base of the first dorsal fin, the twelfth and twenty-fourth of the lateral-line correspond to the origins of the first and second dorsals. An elongated, pointed scale in the axilla. Free portion of the tail in its lowest part equals the postorbital length of the head. *Colours*—silvery, becoming light on the sides and beneath, a black spot at the upper edge of the base of the pectoral fin.

Habitat.—Mauritius, and from Bombay through the seas of India to the Malay Archipelago. At the Andamans I have taken it up to 13 inches in length, but it is said to grow very much larger.

19. Mugil amarulus.

Cuv. and Val. xi, p. 133.

B. vi, D. 4 | $\frac{1}{8}$, P. 16, V. 1/5, A. $\frac{3}{9}$, C. 15, L. l. 36, L. tr. 12.

Length of head $4\frac{1}{4}$, of caudal $4\frac{1}{2}$, height of body $4\frac{1}{4}$ in the total length. *Eyes*—without adipose lids, diameter 1/4 of length of head, 1 diameter from end of snout, and $1\frac{1}{4}$ apart. The greatest width of the head equals its length behind the middle of the eyes, and its height equals its length excluding the snout. Preorbital strongly bent and serrated, leaving the end of the maxilla visible : the mandibles form rather an obtuse angle, are notched at their point of junction, and have a distinct knob : the extent of the cleft is 2/5 that of the width of the gape. Upper lip moderately thick, placed obliquely so as not to form end of the snout. Uncovered space below the chin narrow, and constricted in its middle. A groove before the vomer. *Teeth*—minute in the lower jaw. *Fins*—dorsal spines weak, the fin commences midway between the front edge of the eye and the base of the caudal fin, the length of the spines equals the extent of the postorbital portion of the head : second dorsal rather higher, whilst the extent of its base equals 2/3 of its height. Pectoral inserted above the middle of the depth of the body, its length equals that of the head excluding the snout. Anal arises slightly in advance of the second dorsal than which it is rather higher, the length of its base equals 3/4 of its height, its third spine is $3\frac{1}{4}$ in the length of the head. Caudal lunated, its central rays equal the postorbital length of the head. *Scales*—a short pointed one in the axilla, 18 rows between the snout and base of first dorsal fin, the eleventh and twenty-fourth of the lateral-line correspond to the origins of the first and second dorsals. Second dorsal and anal thickly scaled. Free portion of the tail in its least depth equals the postorbital length of the head. *Colours*—bluish superiorly, becoming light on the sides and beneath, a dark spot at the upper edge of base of pectoral fin : cheeks with a golden tinge : caudal with a dark outer edge.

The foregoing description is (with an exception to be noted) from one of C. and V. types ($2\frac{3}{5}$ inches in length) in the Paris Museum. I obtained a specimen $4\frac{1}{2}$ inches long in Sind, which has a spot at the base of the pectoral fin, but the presence or absence of such a mark is not invariable in *Mugils*.

Habitat.—Seas of India to Java.

20. Mugil labiosus.

Cuv. and Val. xi, p. 125; Bleeker, Timor, ii, p. 213, and Sumatra, ix, p. 6; Günther, Catal. iii, p. 454; Klunz. Verh. z. b. Ges. Wien, 1870, p. 830.

B. vi, D. 4 | $\frac{1}{8}$, P. 15, V. 1/5, A. $\frac{3}{9}$, C. 15, L. l. 36, L. tr. 11-12.

Length of head $4\frac{1}{2}$ to 5, of caudal $5\frac{1}{4}$, height of body $4\frac{1}{3}$ in the total length. *Eyes*—without adipose lids, diameter 1/3 of length of head, 3/4 of a diameter from end of snout, and $1\frac{1}{2}$ diameters apart. The greatest width of the head equals its length excluding the snout, whilst its height is a little more. Interorbital space flat. Profile from snout to dorsal fin rather steep. Preorbital has a very large and deep notch on its anterior surface, it is as deep as the extremity of the bone is broad; preorbital smooth except its posterior extremity, which is serrated: extremity of the maxilla visible. Free space below the chin long, narrow, lanceolate, and with a row of glands along either side. Upper lip forming the end of the snout, thick and fringed: lower lip also thick and fringed, except opposite the symphysis where it is deficient, these fringes decrease with age. On the lower surface of the head is a triangular scaleless spot, the base formed by the lower jaw, the apex being below the middle of the eyes. *Teeth*—absent. *Fins*—the first dorsal commences midway between the hind edge of the eye and the base of the caudal fin, it is rather higher than the second dorsal. Second dorsal commences over the middle of the anal fin. Pectoral reaches to the eleventh scale. Caudal emarginate. *Scales*—cycloid, densely covering the vertical fins, the twelfth and twenty-fourth scales of the lateral-line correspond to the origins of the first and second dorsal fins: 22 rows between snout and base of first dorsal. Free portion of the tail in its least depth equals the length of the head behind middle of the eyes. *Colours*—dark gray above, becoming dull white on the sides and beneath: a dark black spot at base of pectoral fin.

The fringes to the lips existing in my small specimen appear to be absent in the adult stage.

Habitat.—Specimens from $3\frac{1}{3}$ to $4\frac{3}{4}$ inches in length were taken at the Andamans. It extends from the Red Sea, through those of India to the Malay Archipelago.

21. Mugil Borneensis, Plate LXXVI, fig. 1.

Bleeker, Nat. Tijds. Ned. Ind. ii, 1851, p. 201, and Borneo, xiii, p. 55; Günther, Catal. iii, p. 448. *Mugil adustus*, Bleeker, l. c. 1853, p. 503.

B. vi, D. 4 | $\frac{1}{8}$, P. 15, V. 1/5, A. $\frac{3}{9}$, C. 17, L. l. 34, L. tr. 11.

Length of head $4\frac{1}{2}$ to $4\frac{2}{3}$, of caudal 5, height of body $4\frac{1}{2}$ to $4\frac{3}{4}$ in the total length. *Eyes*—without adipose lids, diameter $3\frac{1}{4}$ to 4 in length of head, 3/4 to 1 diameter from end of snout, and $1\frac{1}{2}$ diameters apart. The greatest width of the head equals its length behind the middle of the eye, and its height equals its length excluding the snout. Preorbital scaled, slightly emarginate, serrated inferiorly, posteriorly it is truncated and denticulated: extremity of the maxilla visible. Upper lip moderately thick and forms part of the anterior profile: lower lip not notched above the symphysis but with a tubercle. The mandibles join at rather an acute angle, the extent of the cleft is 4/9 that of the gape: the uncovered space below the chin narrow and lanceolate. A groove before the vomer. *Teeth*—fine ones in the upper jaw. *Fins*—the first dorsal commences midway between the front edge of the eye and the base of the caudal fin, it is not quite so high as the second dorsal, its first spine the strongest, as high as the second and equal to the length of the head behind the middle of the eye. Second dorsal commences over the anterior third of the anal, its height nearly double the length of the base. Anal as high as second dorsal, its base much longer, its first-third is anterior to it: in some of Dr. Bleeker's specimens the first two-thirds of the anal is anterior to the origin of the second dorsal. Pectoral as long as the head excluding the snout. Caudal lunated. *Scales*—with their exposed portion rounded, 21 rows between snout and first dorsal fin: eleventh and twenty-third of lateral-line correspond to the origins of the first and second dorsal fins. A short, scarcely pointed scale in axilla. Second dorsal and anal with fine scales. Free portion of tail equals about half the length of the head. *Colours*—silvery, both dorsals and caudal with dark outer edges.

Habitat.—Seas of India, Calcutta to the Malay Archipelago.

22. Mugil olivaceus.

B. vi, D. 4 | $\frac{1}{8}$, P. 15, V. 1/5, A. $\frac{3}{9}$, C. 17, L. l. 34, L. tr. 11, Cæc. pyl. iv.

Length of head $5\frac{1}{4}$, of caudal 5, height of body $4\frac{2}{3}$ in the total length. *Eyes*—without adipose lids, diameter 1/4 of length of head, nearly 1 diameter from end of snout, and $1\frac{3}{4}$ apart. The greatest width of the head equals its length without the snout, whilst its height is a little less. Preorbital slightly emarginate, truncated posteriorly, and serrated: the end of the maxilla visible. Upper lip moderately thick and forming end of snout. Depth of the cleft of the mouth equals half the extent of its gape, lower lip notched, and a tubercle above the symphysis of the lower jaw. Uncovered space below the chin rather narrow and lanceolate.

No groove before the vomer. *Teeth*—in the upper jaw. *Fins*—spines of first dorsal strong, arising rather nearer the base of the caudal fin than the end of the snout, as high as the second dorsal or the length of the head behind the middle of the eyes. Second dorsal about twice as high as its base is long. Pectoral as long as the head excluding the snout. Anal 3/4 as long as high, with its first 3/4 in advance of the second dorsal, which fin it equals in height. Caudal emarginate. *Scales*—with their exposed portions forming half an irregular hexagon, 21 rows between the snout and base of dorsal fin, eleventh and twenty-second of the lateral-line correspond to the origins of the first and second dorsal fins. Scales on second dorsal and anal. A short angular one in the axilla. Free portion of tail equals the postorbital length of the head. *Colours*—olive along the back, lighter on the sides and beneath: a dull blotch in the axilla, second dorsal and caudal dark externally, anal white.

Habitat.—Seas of India, ascending rivers.

23. Mugil Buchanani.

Bleeker, Beng. en Hind. p. 99.

Mugil Ceylonensis, Günther, Catal. iii, p. 446.

B. vi, D. 4 | $\frac{1}{8}$, P. 15, V. 1/5, A. $\frac{3}{9}$, C. 14, L. l. 34-35, L. tr. 12.

Length of head $4\frac{2}{3}$, of caudal $4\frac{1}{5}$, height of body $4\frac{2}{3}$ in the total length. *Eyes*—without adipose lids, diameter 1/4 of length of head, 3/4 of a diameter from end of snout: the width of the interorbital space equals 2/5 of the length of the head. Profile from dorsal fin to snout descends in rather a curve: interorbital space slightly convex. Snout obtuse, upper lip thin and forming the end of snout. Preorbital with a slight notch, its extremity rounded and denticulated, end of maxilla concealed. The mandibles form an obtuse angle, the depth of the cleft equalling 1/3 of the extent of the gape. Uncovered space below the chin very narrow. *Fins*—first dorsal somewhat nearer base of caudal than end of snout, its spines equal the length of the postorbital portion of the head, and are 1/3 shorter than the rays. Second dorsal twice as high as long, it and the anal arise opposite each other and are of equal height. Pectoral inserted above the middle of the depth of the body, it is nearly as long as the head, and reaches the ninth scale of the lateral-line. Caudal deeply forked. *Scales*—not angular, 19 rows between the snout and base of the first dorsal fin, the eighth and nineteenth scales of the lateral-line correspond to the origins of the first and second dorsal fins. Second dorsal and anal scaled. A short, pointed, axillary scale. Free portion of tail in its least depth equals half the length of the head. *Colours*—greenish superiorly, becoming silvery on the sides and beneath, a dark spot superiorly at the base of the pectoral fin.

Dr. Bleeker showed me his type of this species which agrees with *M. Ceylonensis*.

Habitat.—East coast of Africa, seas of India, ascending rivers. It attains above a foot in length.

24. Mugil Troschellii.

Bleeker, Nat. Tijds. Ned. Ind. xvi, p. 277, and Sumatra, viii, p. 80; Günther, Catal. iii, p. 448.

B. vi, D. 4 | $\frac{1}{8}$, P. 15, V. 1/5, A. $\frac{3}{9}$, C. 15, L. l. 31-33, L. tr. 11, Cæc. pyl. iv.

Length of head $4\frac{2}{3}$ to 5, of caudal 5 to $5\frac{1}{3}$, height of body $4\frac{2}{3}$ to 5 in the total length. *Eyes*—without adipose lids, diameter 2/7 of length of head, nearly 1 diameter from end of snout, and $1\frac{1}{2}$ apart. Interorbital space nearly flat, its width equals $2\frac{1}{4}$ in the length of the head. Height of head equals its length behind the front edge of the pupil of the eye, whilst its width is rather less. Preorbital scaled, emarginate, and strongly serrated along its lower and posterior edges: maxilla bent, and its end uncovered. Upper lip moderately thick and forming the end of the snout. Mandibles meet at an obtuse angle, cleft of the mouth equals 2/5 of the extent of the gape. Uncovered space below the chin narrow, elongated, rounded anteriorly, and constricted along the sides. *Teeth*—distinct in the upper jaw. *Fins*—dorsal arises midway between the front edge of the eye and the base of the caudal, its spines are rather strong, equal 3/5 of the length of the head, and are as high as the second dorsal. Second dorsal twice as high as long, emarginate. Pectoral nearly as long as the head excluding the snout. Anal has its anterior third or half in front of the base of the second dorsal, it is 1/4 higher than its base is long, its lower edge emarginate. Caudal lunated. *Scales*—18 or 19 rows between snout and base of first dorsal fin: ninth and eighteenth scales of the lateral-line correspond to the origins of the first and second dorsal fins. Second dorsal and anal scaled. A short scale in the axilla. Free portion of the tail in its lowest part equals half the length of the head. *Colours*—silvery, sometimes a darkish spot at the upper edge of the base of the pectoral fin.

Habitat.—Seas of India to the Malay Archipelago.

25. Mugil oligolepis, Plate LXXVI, fig. 2.

Bleeker, Nat. Tijds. Ned. Ind. 1858, p. 275, Act. Soc. Ned. Ind. vi, Borneo, xiii, p. 40; Günther, Catal. iii, p. 449.

B. vi, D. 4 | $\frac{1}{8}$, P. 15, V. 1/5, A. $\frac{3}{9}$, C. 16, L. l. 26-28, L. tr. 10.

Length of head $4\frac{2}{3}$, of caudal $4\frac{2}{3}$, height of body $3\frac{2}{3}$ in the total length. *Eyes*—without adipose lids, diameter 2/7 of length of head, 1 diameter from end of snout, and $1\frac{1}{2}$ apart. Interorbital space nearly flat, and its width equal to the length of the postorbital portion of the head. Height of head equals its length excluding the snout, its width a little less. Dorsal profile from above pectoral fin to the snout rather steep. Preorbital

strongly bent, but scarcely notched, it is serrated at its posterior extremity: end of maxilla just visible. Upper lip thin, it forms the end of the snout. Depth of cleft of mouth equal to 1/3 of the width of the gape. Uncovered space below the chin narrow and lanceolate. *Teeth*—not visible. *Fins*—the first dorsal commences between the anterior edge of the eye and the base of the caudal fin, its first spine strong and equal to the length of the head excluding the snout, it is rather higher than the second dorsal. Second dorsal 1/3 higher than long, it commences behind the first third of the anal, whilst the latter is higher than the second dorsal. Pectoral as long as head without the snout. Caudal emarginate. *Scales*—17 rows before the dorsal fin; ninth and seventeenth scales of lateral-line correspond with the origins of the two dorsal fins. No enlarged one in axilla. Free portion of tail, its least height equals the postorbital portion of head. *Colours*—silvery.

Habitat.—Seas and estuaries of India to the Malay Archipelago. The specimen figured is from the Sunderbunds near Calcutta.

26. Mugil Waigiensis, Plate LXXIII, fig. 4.

Mugil, Russell, Fish. Vizag. ii, p. 66, and *Peddaraki sovere*, pl. 182.

Mugil pedaraki, Cuv. and Val. xi. p. 137; Bleeker, Beng. en Hind. p. 48.

Mugil Waigiensis, Quoy and Gaim. Voy. Freyc. Poiss. p. 337, pl. 59, f. 2; Bleeker, Nat. Tijd. Ned. Ind. xvi, p. 276, Atl. Mugil. t. 2, f. 2, Act. Soc. Indo-Ned. vii, Borneo, xiii, p. 43; Günther, Catal. iii, p. 435; Day, Fish. Malabar, p. 144; Kner, Novara Fische, p. 226.

Mugil macrolepidotus, Rüpp. Atl. Fische, p. 140, t. 35, f. 2; Cuv. and Val. xi, p. 134; Cantor, Catal. p. 95.

Mugil melanochir, (Kuhl and v. Hass.); Cuv. and Val. xi, p. 143 (young); Bleeker, Borneo, vi, p. 423.

B. vi, D. 4 | $\frac{1}{7\text{-}8}$, P. 17, V. 1/5, A. $\frac{3}{8}$, C. 15, L. l. 26-27, L. tr. 9, Cæc. pyl. x, Vert. 11 | 13.

Length of head $4\frac{2}{3}$ to 5, of caudal 6, height of body 5 to $5\frac{1}{4}$ in the total length. *Eyes*—without adipose lids, diameter $4\frac{1}{4}$ to $4\frac{1}{2}$ in length of head, 1 to $1\frac{1}{4}$ diameters from end of snout, and 2 apart. The width of the interorbital space equals the length of the postorbital portion of the head. General appearance short and stout with a depressed head. Height of head equals its postorbital length. Snout obtuse, the centre of the upper lip forming the end of the snout: the mandibles form a very obtuse angle: the maxilla reaches to below the front third of the eye. Preorbital bent, not notched, but strongly serrated, the lower extremity of the maxilla visible. Uncovered space on chin narrow and lanceolate. *Teeth*—fine ones in the upper jaw. *Fins*—the first dorsal commences midway between the anterior edge of the eye and the base of the caudal fin, its spines are stout, the second the longest and nearly equal to 1/2 the height of the body, but only 2/3 as high as the second dorsal: the origins of the first and second dorsal fins correspond to the eighth and seventeenth scales of the lateral-line. Pectoral as long as the head excluding the snout. Anterior third of anal before the origin of the second dorsal, the two fins of equal height. Caudal slightly emarginate. *Scales*—some are minutely ctenoid, they are extended over the vertical fins: no distinctly elongated one in the axilla: 15 or 16 rows between snout and base of first dorsal. Lowest depth of free portion of the tail equals the length of the head behind the middle of the eyes. Cæcal appendages bifurcated. *Colours*—brownish above, becoming dull white below, a dark streak along each row of scales: fins generally deep black.

Habitat.—From the Red Sea, through those of India to the Malay Archipelago, China, and beyond. It ascends rivers during the rainy season as high as the tides reach. It attains a foot or more in length, and is good eating. The one figured (life-size) is from Bombay.

Family, XXXV—AULOSTOMATEIDÆ, *Cantor.*

Fistularidæ, pt., Mull,; *Aulostomatoidei*, pt., Bleeker.

Branchiostegals five to seven: pseudobranchiæ. Gills four. Form of body elongated: the anterior bones of the skull produced, forming a long tube, and having a small mouth at its anterior extremity. Teeth small. Spinous dorsal, when present, formed of isolated spines: soft dorsal and anal of moderate length: ventrals abdominal with six rays, no spine, and separated from the pubic bones which are attached to the humeral arch. Scales small or none, but parts of the skeleton or else dermal productions may be in the form of external plates. Air-vessel large. Pyloric appendages few. Vertebræ numerous.

Dr. Günther observes that in *Aulostomateidæ* "the ventrals have an abdominal position in consequence of the prolongation of the pubic bones, which are attached to the humeral arch." In the *Centriscidæ* on the contrary we find the "ventral fins truly abdominal, imperfectly developed."

Genus, 1—Fistularia, *Linnæus.*

Solenostomus, sp. Klein and Gronov.; *Cannorhynchus*, Cantor.

Branchiostegals seven. Mouth slightly cleft. Dorsal and anal fins composed entirely of undivided rays: caudal forked, with one or two of its central rays very elongated and filiform. No scales, but some bony casing behind the head above and below.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Fistularia serrata*, D. 13-15, A. 14-15. Immaculate.

1. **Fistularia serrata**, Plate LXXVI, fig. 3.

Fistularia tabaccaria, White, Voy. Bot. Bay, p. 296, f. 2; Linn. p. 515.

Fistularia tabaccaria, var. Bl. viii, p. 130, t. 387, f. 2, 3; Bl. Schn. p. 114; Russell, Fish. Vizag. ii, p. 58, and *Goorum*, pl. 173.

Fistularia serrata, Cuv. Règ. Anim.: Günther, Catal. iii, p. 533; Kner, Novara Fische, p. 238; Klunz. Verh. z. b. Ges. Wien, 1871, p. 515.

Fistularia immaculata, Cuv. Règ. Anim.; Richards. Ich. China, p. 247; Tem. and Schleg. Fauna Japon. Poiss. p. 320; Bleeker, Amb. and Ceram. p. 281, and Japan, p. 11; Jerdon, M. J. L. and Sc. 1851, p. 140.

Fistularia Commersonii, Rüpp. N. W. Fische, p. 142; Peters, Wiegm. Arch. 1855, p. 258.

Cannorhynchus immaculatus, Cantor, Catal. p. 211.

Cannorhynchus serratus, Bleeker, Arou. 1873, p. 3, and Fish. Madagascar, p. 74.

B. vii, D. 13-15, P. 13, V. 1/5, A. 14-15, C. 10/1/10.

Length of head 2/5 to the end of tail (excluding the filament). *Eyes*—$1\frac{1}{2}$ diameters in the postorbital portion of the head. A serrated ridge from the anterior superior angle of the eye to the nostril. *Fins*—the rays undivided. *Colours*—brown, dirty white beneath: occasionally light spots on the back and sides.

At the Andaman islands I found this fish frequenting the most muddy localities; it is common at Madras.

Dr. Le Vaillant has lately (1874) shown that the elongated central ray from the tail fin of this fish has been employed in the manufacture of the interesting *Serranus phaëton*, Cuv. and Val. ii, p. 310, pl. 34; Günther, Catal. i, p. 100, distinguished from all others of the genus by the presence of a deeply forked caudal fin, having the middle ray much elongated.

Habitat.—From the East coast of Africa, through the seas of India to the Malay Archipelago, China, and New Holland.

FAMILY, XXXVI—CENTRISCIDÆ, *pt. Bleeker.*

Fistularia, pt. Muller: *Amphisiloidei*, pt. Bleeker.

Branchiostegals three or four: pseudobranchiæ. Gills four. Form of body oblong, or elevated and compressed: the anterior bones of the skull produced, forming a long tube, and having a small mouth at its anterior extremity. Teeth absent. Two dorsal fins, the first short and having one of its spines strong: the soft dorsal and anal of moderate extent: ventrals abdominal, spineless, and rudimentary. Scales, if present, small: the body usually covered with a cuirass or ossifications which are not confluent with one another. Air-vessel large. Pyloric appendages absent. Vertebræ few.

Genus, 1—Amphisile *(Klein) Cuv.*

Branchiostegals three or four: pseudobranchiæ. Gill-openings of moderate width. Body elongated and strongly compressed. A dorsal cuirass formed by portions of the skeleton. Teeth absent. Two dorsal fins situated far back: ventrals rudimentary. Air-vessel large. Pyloric appendages absent.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Amphisile scutata*, D. 3/10-12, A. 12. Silvery.

1. Amphisile scutata, Plate LXXVI, fig. 5.

Centriscus scutatus, Linn. Syst. Nat. i, p. 415; Bl. i, p. 57, t. 123, f. 2; Gmel. Linn. p. 1460; Bl. Schn. p. 113; Lacép. ii, p. 88, i, pl. 19, f. 2; Shaw, Zool. v, p. 458, pl. 181, Gronov. ed Gray, p. 138; Bleeker, Fish. Madagascar, p. 75.

Amphisile scutata, Cuv. Règ. Anim.: Guér. Icon. Poiss. pl. 45, f. 3; Jerdon, M. J. L. and Sc. 1851, p. 140; Günther, Catal. iii, p. 525; Lütken, Vid. Medd. ntch. Fören. kjob. 1865, p. 213; Klunz. Verh. z. b. Ges. Wien, 1871, p. 516.

B. iii, D. 3 | 10-12, P. 10, V. 3, A. 12, C. 10, Vert 6/14.

Length of head $3\frac{1}{4}$, height of body 7 in the total length. *Eyes*—$1\frac{1}{2}$ diameters in the postorbital length of the head: interorbital space concave. Body strongly compressed, the head anteriorly ending in a long tubular snout, having a small terminal mouth. The dermal skeleton ends posteriorly in a long spine, close beneath which are the three spines of the first dorsal fin, below these again is the second dorsal, whilst the caudal appears on the lower surface of the body just behind the anal. Pectoral about midway between the end of the snout and the base of the first dorsal spines. Ventrals rudimentary and situated on the cutting abdominal edge below the third rib. *Colours*—whitish, shot with pink.

Lütken (Ich. Not. 1866) considers *Amphisile macrophthalmus*, Steind. as a synonym of the *A. scutata*. Whilst the *A. scutata*, Steind. he believes to be *A. strigata*, Günther.

Habitat.—Seas of India to China. The one figured (life-size) is from Madras, where they are not uncommon.

Family, XXXVII—OPHIOCEPHALIDÆ,* *Bleeker.*

Labyrinthici, pt. Cuv.

Branchiostegals five: pseudobranchiæ absent. Gills four. Body elongated, subcylindrical anteriorly: head depressed, having superiorly somewhat plate-like scales. Eyes lateral. Gill-openings wide, the membranes of the two sides being connected beneath the isthmus. A cavity exists above and accessory to the true gill cavity, but although some thin bony laminæ are present, no suprabranchial organ is developed. Teeth in the jaws, vomer, and palate, some of which may be conical. A single, long, spineless dorsal fin, and a similarly constructed though shorter anal. Ventrals thoracic *(Ophiocephalus)* or absent *(Channa)*, when present consisting of six rays, the outer of which is unbranched and sometimes articulated at its extremity. Scales of large, moderate, or small size. Lateral-line abruptly curved or almost interrupted. Air-vessel present. Pyloric appendages, when present, few.

The *Ophiocephalidæ* having hollow cavities in their heads, and an amphibious mode of respiration, are able to exist for lengthened periods out of their native element, and can travel some distance over the ground, especially when moist. Jugglers both in India and China exhibit these fishes walking on the land, and children amuse themselves by making them crawl along. "In China they are often carried alive in pails of water and slices are cut for sale as wanted: the fish selling dear whilst it retains life, while what remains after death is considered as of little value."†

Owing to the breadth of their bodies, they are able to progress in a serpentine manner, chiefly by means of their pectoral and caudal fins, first one of the former being advanced and then its fellow. They are exceedingly difficult to retain in aquaria, unless the top is covered over, as otherwise they manage to escape and proceed on their travels.

The different species are somewhat difficult to distinguish from one another, owing to their similarity in colour, the change of livery according to age and locality, and the slight variation in the number of fin rays and scales. The young as a rule are of a more or less orange or scarlet colour, and light longitudinal bands appear to be usually restricted to the immature. Those residing in brackish waters have a purplish tinge.

These fishes appear to be monogamous, some breeding in grassy swamps or the edges of tanks: some in wells or stone-margined receptacles for water: and others again in holes in the rivers' banks. The *O. striatus* in Mysore‡ is said to construct a nest with its tail amongst the vegetation near the edges of the tanks, whilst it bites off the ends of the weeds which grow in the water. Here the ova are deposited, the male keeping guard, but should he be killed or captured, the vacant post is filled by his partner.‡ When very young the fry of all these species keep with and are defended by their parents, but as soon as they are sufficiently strong to capture prey for themselves, they are driven away to seek their own subsistence: those which are too obstinate to leave, being, it is believed, eaten by their progenitors.

The varieties which live in tanks and swamps delight in residing at their shallow and grassy edges, so that they can take in with ease their modicum of air for the purpose of breathing, or capture any frog that may incautiously venture too close to their lair.

These fishes appear to be well adapted for pisciculture, as some grow to a large size, whilst all are good eating. The smallest, *O. gachua*, attains about a foot in length and thrives in almost any situation. They are rather voracious, but appear to consider a frog, mouse, or rat as luscious a morsel as a fellow fish. They assist in keeping water pure by destroying either animal or vegetable substances which may come in their way.

As regards the facility with which these fishes may be conveyed long distances alive, good illustrations are afforded by the following occurrences. On July 19th, 1866, I was bringing some of the *O. gachua* from the plains to the hills, and a cooly accidentally turned one out of the can of water at 5.55 p.m., when the temperature of the air was 69°, it was not discovered until 8·45 p.m., when the fish was found alive and well on the gravel walk outside the house. On another occasion I was conveying nine from Coonoor to Ooty in an earthen vessel of water in which the temperature was 76°; the transit occupied from 12 a.m. to 4·45 p.m. during which period the water experienced a fall of 21°, but the fish were not affected thereby. I carried one of these fish in a wet pocket handkerchief from Kullaar to Wellington, or an ascent of about 5000 feet, which took four hours in accomplishing, and it did not seem much the worse for its trip.

Judging from their habits in an aquarium some of the *Ophiocephali* prefer dirty to clean water, perhaps for purpose of concealment. When they have stirred up all the sediment and exuded a quantity of mucus they appear to be delighted, their colours become much more vivid, and they ascend to their favourite resort, lying

* Bloch thus named the genus owing to their heads having a resemblance to those of serpents. Cuvier remarked that if it were possible to admit that anomalous beings existed in nature, there would be none that might more justly be considered such than these fishes.

† Hamilton Buchanan, *Fishes of Ganges*, p. 59.

‡ Colonel Puckle.

amongst the vegetation just beneath the surface of the water. As soon as clean water is given them they become excited as if they imagined the time had arrived when they should change their abode.

Amongst the fish which I have personally seen exhumed from the mud, where a tank had dried up, were some *Ophiocephali*, whilst they are also among the fish recorded by the natives of India as descending with the downpours of rain.

Geographical distribution.—Fresh-water fishes distributed throughout India, Burma, Ceylon, and the east, from elevated localities, and the most inland districts, to within the influence of the tides. They inhabit both ponds and rivers, and are able to change their place of abode by traversing moist pieces of ground intervening between one piece of water and another. They possess an accessory cavity to the gills, and are able to respire direct from the atmosphere.

Uses.—All these fishes are useful as food, those which inhabit rivers being better flavoured than the others which live in sluggish or stagnant water. Some classes however object to them on account of the resemblance their heads bear to those of serpents, (see p. 346 ante.).

Genus, 1—OPHIOCEPHALUS, *Bloch.*

Ventral fins present. Pyloric appendages two. Definition otherwise as in the family.

Although I have given nine species of *Ophiocephalus* as found in India, I am doubtful whether two, viz., *O. leucopunctatus** and perhaps *O. pseudomarulius* might not be considered as varieties of *O. marulius*.

SYNOPSIS OF SPECIES.

1. *Ophiocephalus marulius*, D. 45-55, A. 28-36, L. l. 60-70, L. tr. $\frac{4\frac{1}{2}}{13}$ or $\frac{5\frac{1}{2}}{13}$. Orange, banded, having white spots and a black light-edged ocellus at root of caudal fin. Throughout India to China.
2. *Ophiocephalus leucopunctatus*, D. 47-53, A. 28-35, L. l. 59-60, L. tr. $\frac{4\frac{1}{2}}{13}$ or $\frac{5}{13}$. Orange, banded, having white spots, no caudal ocellus. Deccan and sea coasts of India to China.
3. *Ophiocephalus pseudomarulius*, D. 52, A. 35, L. l. 64, L. tr. $\frac{6}{14}$. Orange, banded, a black spot at base of caudal. India.
4. *Ophiocephalus barca*, D. 47-52, A. 34-36, L. l. 60-65, L. tr. $\frac{5}{13}$. Ventral 2/5 of length of pectoral. Dark violet, spotted, as are also the fins. Large rivers of Bengal.
5. *Ophiocephalus micropeltes*, D. 43-46, A. 27-30, L. l. 95-110, L. tr. $\frac{7}{13}$. Young scarlet with two black bands, adults gray spotted with black. Western coast of India to Siam and the Malay Archipelago.
6. *Ophiocephalus striatus*, D. 37-45, A. 23-26, L. l. 50-57, L. tr. $\frac{4\frac{1}{2}}{9}$ or $\frac{5\frac{1}{2}}{10}$. Dark gray, passing in stripes into the white of the abdomen. India to China.
7. *Ophiocephalus Stewartii*, D. 39-40, A. 27, L. l. 47-50, L. tr. $\frac{4\frac{1}{2}}{9}$. Ventrals 1/3 as long as pectoral. Purplish, spotted with black. Cachar and Assam.
8. *Ophiocephalus gachua*, D. 32-37, A. 21-23, L. l. 40-45, L. tr. $\frac{3}{7}$. Ventrals 2/5 as long as pectoral. Pectoral fin banded, vertical fins edged with red. India, Burma, and Andamans.
9. *Ophiocephalus punctatus*, D. 29-32, A. 21-23, L. l. 37-40, L. tr. $\frac{4-6}{9}$. Spotted or banded, vertical fins dark with a light edge. India and Burma.

1. Ophiocephalus marulius, Plate LXXVI, fig. 4 (*young*).

Ham. Buch. Fish. Ganges, pp. 65, 367, pl. 17, f. 19; Cuv. and Val. vii, p. 432; Bleeker, Beng. en Hind. p. 42; Jerdon, M. J. L. and Sc. 1848, p. 146; Günther, Catal. iii, p. 478; Day, Fishes of Malabar, p. 146.

? Ophiocephalus Theophrasti, Val. in Jacq. Voy. Ind. Or. pl. xiii, f. 1.

Ophiocephalus aurolineatus, Day, Proc. Z. S. 1870, p. 99 (*young*).

Hoovina murl, Can.; *Pu verarl*, Tam.; *Pu murl*, Hind.; *Pula chapa*, Tel.; *Choaree verarl* and *Curavu*, Mal.; *Kubrah*, *Sawl* and *Dowlah*, Punj.; *Nga-yan-dyne*, Burm.; *Ha-al*, Assam.

B. v, D. 45-55, P. 18, V. 6, A. 28-36, C. 14, L. l. 60-70, L. tr. $\frac{4\frac{1}{2}-6\frac{1}{2}}{13-11}$ or $\frac{5\frac{1}{2}-8\frac{1}{2}}{13-11}$.

Length of head from 4 to 5, of caudal 6 to $7\frac{1}{2}$, height of body 7 to $7\frac{1}{2}$ in the total length. *Eyes*—diameter 1/7 (1/5 in the young) of length of head, 1 to $1\frac{1}{2}$ diameters from end of snout, and also apart. The greatest width of the head equals 1/2 or 2/3 of its length, and its height equals 1/2 its length excluding the snout. The maxilla extends 1/2 a diameter of the eye behind the orbit. *Teeth*—in numerous villiform rows in jaws, vomer, and palate, whilst a posterior row of about 12 large conical teeth exists on either ramus of the mandibles. *Fins*—dorsal and anal somewhat lowest anteriorly. Pectoral rather more than 1/2 as long as the head but not reaching to above origin of anal: ventral 2/3 as long as pectoral. *Scales*—about ten rows between the orbit and the angle of the preopercle. The plate-like ones on the summit of the head of moderate size: 16 rows between snout and base of dorsal fin: 10 between eye and angle of preopercle. Scales on the head are roughened by raised lines, which surround in an angular course a central spot, on the body the outer edge of the scales are smooth. *Lateral-line*—first passes along 16 or 18 rows of scales, then descends for two rows, and subsequently passes direct to the centre of the caudal. *Colours*—vary both with age and the water they reside in. Back grayish green, the immature with a brilliant orange band passing

* See remarks respecting hybrids, p. 364.

from the eye to the middle of the caudal fin, but in the more mature there are five or six cloudy bands descending to below the lateral-line: abdomen orange, the bases of each scale darkest: on the posterior third of the body, on the dorsal, anal, and caudal fins are pearly-white spots, and there is generally a large black ocellus at the upper part of the base or first-third of the caudal fin, which latter is gray, ventrals orange.

"In the lower parts of Bengal, the persons dedicated to religion, from some old prejudice, think it unlucky to say that it (*O. marulius*) is either good or bad." (*Ham. Buch.*)

"Some of the Karens in Burma regard these fishes with superstitious awe, and abstain from eating them. They have a legend that they were formerly men, changed into fish for their sins, and the Karens of Tavoy say, 'if people eat them, they will be transformed into lions.'" (*Mason*).

Habitat.—Fresh waters, principally rivers, from Ceylon and India to China: attaining as much as four feet in length. Colonel Puckle observes "that they are very savage, protecting their young with great boldness." They take a live bait pretty well.

2. Ophiocephalus leucopunctatus, Plate LXXVII, fig. 1.

? Ophiocephalus punctatus, Russell, Fish. Vizag. ii, p. 48 (not Bloch), and *Sowarah*, pl. 173.

Ophiocephalus leucopunctatus, Sykes. Trans. Z. S. ii, p. 352, pl. 60, f. 3; Bleeker, Beng. en Hind. p. 42.

? Ophiocephalus sowarah, Cuv. and Val. vii, p. 426; Bleeker, Beng. en Hind. p. 42.

Ophiocephalus grandinosus, Cuv. and Val. vii, p. 434, pl. 203; Bleeker, Beng. en Hind. p. 42; Günther, Catal. iii, p. 478.

B. v, D. 47-53, P. 18, V. 6, A. 28-35, C. 14, L. l. 59-60, L. tr. $\frac{4\frac{1}{2}\text{-}6\frac{1}{2}}{13\ \ 11}$ or $\frac{5-8}{13-11}$.

Length of head 4, of caudal 6, height of body 7 to $7\frac{1}{4}$ in the total length. *Eyes*—diameter 8 in length of head, $1\frac{1}{2}$ diameters from end of snout, and $1\frac{1}{2}$ to 2 apart. The width of the head equals 4/7 of its length, and its height equals 1/2 its length excluding the snout. The maxilla extends to 1/2 a diameter of the eye behind the orbit. *Teeth*—about ten conical, widely separated teeth exist in the lower jaw. *Fins*—dorsal commences over the end of the opercle, it reaches nearly or quite to above the anal: ventral 2/3 as long as the pectoral. Caudal fan-shaped. *Scales*—as in *O. marulius*, 16 rows between snout and base of dorsal fin, the plate-like ones on the summit of the head of moderate size: ten rows between eye and angle of preopercle. *Colours*—back grayish-green, descending in bars on to an orange abdomen: numerous white spots on the body sometimes with a black margin: caudal and posterior portions of the dorsal and anal black, with numerous white spots.

Whether this fish should be considered more than a local variety of *O. marulius* may be questioned, both are found along the sea coasts of India, and the former also in the Deccan. Dussumier brought it from Malabar, and I found it was not uncommon in Canara, even more so than the *O. marulius*. In Bengal proper, Burma, and inland districts, except the Deccan, this form, wanting the ocellus on the tail, appears to be absent.

I have a stuffed specimen 10 inches long, which appears intermediate between the *O. marulius*, *O. leucopunctatus* and *O. pseudomarulius*, L. l. 64, L. tr. $\frac{6-7}{14-10}$, head $4\frac{1}{3}$, caudal $6\frac{1}{4}$, height of body 6 in the total length. Colours as in *O. leucopunctatus* except the end of the dorsal fin is coloured as in Ham. Buch. figure of *O. wrahl*, and the caudal is transversely barred in zigzag lines, leaving an indistinct ocellus at the upper edge of its base, it appears to me as if it were a hybrid between *O. marulius* and *O. striatus*, and may be *O. pseudomarulius*.

Habitat.—Coromandel and Western coasts of India, also in some of the rivers of the Deccan: it appears to be found in China.* It attains 3 feet or more in length. The one figured is from a Malabar specimen.

3. Ophiocephalus pseudomarulius.

Günther, Catal. iii, p. 478.

B. v, D. 52, P. 17, V. 6, A. 35, C. 15, L. l. 64, L. tr. $\frac{6-7}{14-10}$.

Length of head $3\frac{1}{4}$, height of body $4\frac{2}{3}$ in the total length to the base of the caudal fin.† *Eyes*—diameter 7 in length of head, 1 diameter from end of snout, and $1\frac{3}{4}$ apart. The greatest width of the head equals rather more than 1/2 its length, and its height equals 1/2 of its length excluding the snout. The maxilla reaches to beyond the vertical from the hind edge of the eye. *Teeth*—an inner row of six or eight rather widely separated conical ones in the lower jaw. *Fins*—dorsal commences above the base of the pectoral, its posterior rays are the highest, and they exceed those of the anal. Pectoral [1/2 as long as the head: ventral 3/4 of pectoral.] *Scales*—the plate-like ones on the summit of the head of moderate size, 16 rows between snout and base of dorsal fin: 10 between eye and angle of preopercle: those on the head roughened in lines which externally are parallel with their outer edges, whilst those on the body are roughened in arched ridges which converge to a line along the centre of each, the outer edge of those on the body smooth. *Colours*—gray superiorly, becoming lighter

* Since the above was written I have seen a fine specimen in the British Museum from the Cauvery River.

† The single stuffed specimen in the British Museum being much damaged, the length of the caudal fin (of which not half remains) has been omitted. The pectorals and ventrals are likewise broken, whilst the dorsal and anal are dried down to the body, so that, being unable to count them, Dr. Günther's enumeration has been copied. The proportions within brackets are likewise from Dr. Günther's original description.

along the sides and beneath. "A black, white-edged ocellus, superiorly on the basal portion of the caudal fin," Günther, *l. c.* See remarks under *O. leucopunctatus* (p. 364).

Habitat.—India, originally received from the East India Museum as *O. wrahl.*

4. Ophiocephalus barca, Plate LXXVII, fig. 2.

Ham. Buch. Fish. Ganges, pp. 67, 367, pl. 35, f. 20; Cuv. and Val. vii, p. 436; McClell. C. J. N. H. i, p. 427, pl. xi, f. 3; Bleeker, Ben. en Hind. p. 42; Günther, Catal. iii, p. 477.

? *Ophiocephalus nigricans,* Cuv. and Val. vii, p. 431; Günther, Catal. iii, p. 477.

Bora chung, Russell, J. A. S. of Beng. viii, 1839, p. 551.

Ophiocephalus amphibius, McClell. C. J. N. H. v, p. 275; Bleeker, Beng. en Hind. p. 42.

B. v, D. 47-52, P. 16, V. 1/5, A. 34-36, C. 19, L. l. 60-65, L. tr. $\frac{5-6}{13}$.

Length of head 4 to $4\frac{1}{2}$, of caudal $4\frac{1}{2}$ to $5\frac{1}{2}$, height of body $5\frac{1}{2}$ to $7\frac{1}{2}$ in the total length. *Eyes*—diameter 7 to $7\frac{1}{2}$ in length of head, from $1\frac{1}{2}$ to 2 diameters from end of snout, and 2 apart. Height of head not so great as its width which equals that of the body, and almost the length of the postorbital portion of the head. The posterior extremity of the maxilla reaches to nearly 1 diameter behind the hind edge of the eye. *Teeth*—amongst the small ones are a few widely separated conical ones in an inner row in the lower jaw, two or three large ones on vomer, and a few on the palatines. *Fins*—dorsal commences above the posterior extremity of the opercle and is almost 3/4 as high as the body. Pectoral does not quite reach to above the commencement of the anal fin, while the ventral is 2/5 of its length. Anal similar to dorsal. Caudal rounded. *Scales*—plate-like scales of moderate size on the summit of head, 15 rows between snout and base of dorsal fin, nine rows between eye and angle of preopercle. The scales are roughened in lines, forming irregular arches and springing from the centre of the base or middle of each scale. Those on the anterior posterior of the body are rather smaller than those in its posterior portion. *Colours*—dark violet superiorly, becoming dull white shot with purple beneath, the whole of the back and sides covered with large black blotches, some also exist on the dorsal, caudal, and anal fins, each of which have a red edge: pectorals reddish, with numerous black spots.

The type of *O. amphibius, l. c.* 17 inches long, has a few more scales, L. l. 80, L. tr. 8/17. Length of head 5, height of body 7 in the total length. *Eyes*—diameter 6 in length of head, 1 diameter from end of snout, and $1\frac{1}{2}$ apart. Otherwise as above. The specimen in the Calcutta Museum is from Bootan.

Habitat.—Large rivers of the Bengal Presidency, portions of the North Western Provinces, and Assam. It attains three feet in length. The specimen figured is 13 inches long, and from Calcutta. "It inhabits perpendicular banks, in holes dug like those of the *Martin (Hirundo).* In these it lurks, watching for its prey, with its head out." (Ham. Buchanan).

5. Ophiocephalus micropeltes, Plate LXXVII, fig. 4.

(Kuhl. and v. Hass.), Cuv. and Val. vii, p. 427; Bleeker, Verh. Bat. Gen. xxxiii, Labyr. p. 12; Günther, Catal. iii, p. 482.

Ophiocephalus serpentinus, Cuv. and Val. vii, p. 420; Griff. in Cuv. An. King. x, pl. 52, f. 2.

Ophiocephalus diplogramme, Day, P. Z. S. 1865, p. 36, and Fish. Mal. p. 147, pl. x *(young).*

B. v, D. 43-46, P. 15, V. 1/5, A. 27-30, C. 15, L. l. 95-110, L. tr. $\frac{7-8}{13-12}$, Vert. 53.

Length of head $3\frac{1}{2}$ to $3\frac{2}{3}$, of caudal $6\frac{1}{2}$ to $7\frac{1}{2}$, height of body 6 to $6\frac{1}{2}$ in the total length. *Eyes*—diameter $8\frac{1}{2}$ in length of head, (7 in the young), 2 to 3 diameters from end of snout, 2 to $2\frac{1}{4}$ apart. Width of head equals 4/7 of its length, its height equals nearly 1/2 its length. The maxilla reaches to rather behind the hind edge of the eye: lower jaw slightly the longer. *Teeth*—a widely separated row of conical ones in the lower jaw, vomer, and palatines. *Fins*—dorsal commences above the last fourth of the opercles, is of equal height to the anal or 1/2 the height of the body. Pectoral reaches to above the commencement of the anal: ventral about half as long as the pectoral, it has a distinct although weak unarticulated spine and five rays. Caudal fan-shaped. *Scales*—those on the upper surface of the head, although plate-like, are comparatively small, 22 rows between the snout and base of dorsal fin, 16 or 17 between the eye and angle of the preopercle. The scales are roughened in lines which on the head are more or less parallel with the outer margin of each scale, along the body they are arched. *Lateral-line*—descends gently to a little behind the end of the pectoral fin when it becomes straight. *Colours*—vary considerably, in the *adult* grayish-brown, with the head, back, and sides sprinkled with small brown spots. Dorsal fin gray, with three or four narrow dark bands and a white outer edge: anal gray, with a white margin. Caudal gray, spotted with black, and having a narrow white outer edge. In the *young,* and up to 12 or 14, or even to 18 inches in length, the back is grayish, sides of an orange scarlet: a black band goes through the eye to the upper half of the caudal fin, and a second from the angle of the mouth to its lower half. In some, vertical bars are also present.

The difference in colour in these two varieties makes it almost incredible that they can be the same species, but not only have I examined a large number of specimens from Malabar and Canara, but seen similar instances at Berlin, and the Hague. The change of colour is not simply due to size, the immature livery being sometimes retained in very large specimens.

Habitat.—Malabar and Western coast of India, Siam to the Malay Archipelago. It attains at least three feet in length. The specimen figured (15 inches long) was from Trichoor in Malabar.

6. Ophiocephalus striatus.

Bloch, t. 359; Bl. Schn. p. 238; Shaw, Zool. iv, p. 530; Russell, Fish. Vizag. ii, p. 47, and *Muttah*, pl. 162; Cuv. and Val. vii, p. 417, pl. 202, 206; Swainson, Fishes, ii, p. 237; Bleeker, Beng. en Hind, p. 42; Cantor, Catal. p. 92; Jerdon, M. J. L. and Sc. 1848, p. 146; Günther, Catal. iii, p. 474; Kner, Novara Fische, p. 234; Day, Fish. Malabar, p. 148.

Ophiocephalus wrahl, Lacép. iii, p. 552; Ham. Buch. Fish. Ganges, pp. 60, 367, pl. 31, f. 17.

Ophiocephalus chena, Ham. Buch. *l. c.* pp. 62, 367.

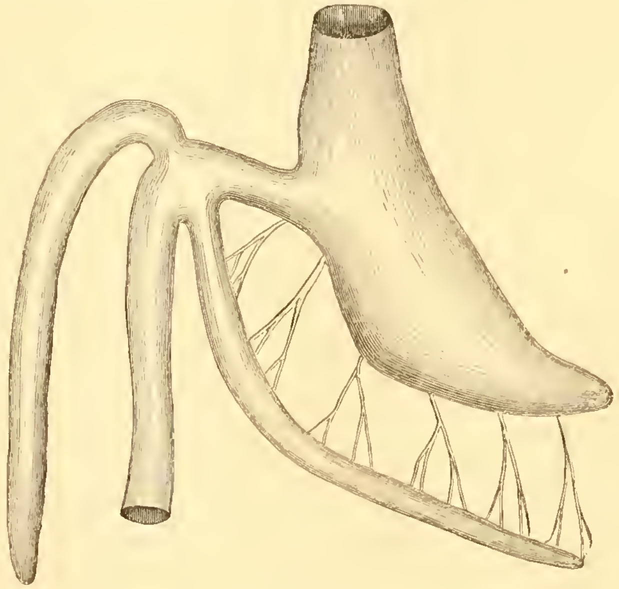
Morrul, Murl, Dheri murl, Hind.; *Sol* and *Chena*, Beng.; *Verarl* and *Wrahl*, Mal.; *Verarlu* and *Currupu verarl*, Tam.; *Sowarah*, Tel.; *Sola*, Ooriah; *Koochina murl*, Canarese; *Loolla*, Singhalese; *Nga-ain-di*, Mugh.

B. v, D. 37-45, P. 17, V. 6, A. 23-26, C. 13, L. l. 50-57, L. tr. $\frac{4\frac{1}{2}-7}{9-7}$ or $\frac{5\frac{1}{2}-8}{10-9}$, Vert. 13 | 39.

Length of head $3\frac{1}{3}$ to 4, of caudal 6, height of body 6 to 8 times in the total length. *Eyes*—diameter 1/6 to 1/7 of length of head, 1 diameter from end of snout, and $1\frac{1}{2}$ apart. Greatest width of head 1/2 to 4/9 of its length, its height equals 1/2 its length excluding the snout. Lower jaw the longer: the maxilla reaches to below the hind edge of the eye, or even 1 diameter behind it. *Teeth*—an inner row of conical ones in the lower jaw, and cardiform ones on the palatines. *Fins*—the pectoral does not quite reach to above the origin of the anal. *Scales*—the plate-like ones on the summit of the head large and irregularly shaped, from 18 to 20 rows between the snout and the origin of the dorsal fin: nine rows between the eye and angle of the preopercle. The number of rows between the lateral-line and the dorsal fin appears subject to variation, some from the East Indian Archipelago and Philippines having only L. tr. $\frac{3-4}{8-9}$, and fewer rows between the snout and base of the dorsal fin,* have been termed *O. vagus*, Peters. (Monats. Akad. Berlin, 1868, p. 260.) The scales on the head are roughened in lines parallel to their margins, on the body they are arched towards the centre of each. *Lateral-line*—curves downwards below the twelfth dorsal ray. *Colours*—dark grayish or blackish superiorly, becoming dirty-white or yellowish-white beneath: cheeks and lower surface of the mouth streaked and spotted with gray: bands of gray or black from the sides to the abdomen. Some spots and bars at the posterior end of the dorsal fin: ventrals and anal grayish, with some whitish lines or spots along the base of the latter. In the young there is occasionally a large black ocellus at the end of the base of the dorsal fin, and the body may be destitute of any marks.

In Burma the Telaings have a ceremony with one of these fish, said to be very efficacious in cases of sickness. The patient promises that either at the present time or subsequent to his recovery he will propitiate the spirit which he has offended. A Nga-yan (*Ophiocephalus striatus*) is brought, and the sick person has to pass a string through its nostrils in the same way that a cord is passed through the nose of a bullock. A circle is then formed of the relatives, they dance round this fish, which is also dragged after them, and other offerings are then made.

Habitat.—Fresh waters throughout the plains of India, Ceylon, Burma, to China and the Philippines, especially delighting in swamps and grassy tanks: they attain 3 feet or more in length. They take a bait very readily, especially a frog, and are said to rise to the salmon fly.



STOMACH AND CÆCAL APPENDAGES OF *Ophiocephalus striatus.*

* Since the above was in type I have looked over some of Dr. Bleeker's specimens of *O. striatus*, they have either three or four entire and two half rows between the lateral-line and base of first dorsal ray. Some of mine from India have the same number, others have even five and six entire and two half rows at the same spot.

7. Ophiocephalus Stewartii, Plate LXXVII, fig. 3.

Ophiocephalus Stewartii, Playfair, P. Z. S. 1867, p. 14, pl. 3.
Sen-ga-lee, Assam.

B. v, D. 39-40, P. 17, V. 6, A. 27, C. 14, L. l. 47-50, L. tr. $\frac{4\frac{1}{2}-5\frac{1}{2}}{9-7}$.

Length of head 4, of caudal $5\frac{1}{2}$, height of body 7 to 8 in the total length. *Eyes*—diameter $6\frac{1}{2}$ in length of head, $1\frac{1}{4}$ diameters from end of snout, and 2 apart. The greatest width of the head equals its length behind the eyes, and its height equals 4/9 of its length. The maxilla reaches to rather beyond the hind edge of the eye. *Teeth*—some conical ones in the lower jaw, also on the vomer and palate. *Fins*—the dorsal commences over the base of the pectoral fin, is 2/3 as high as the body and higher than the anal. Pectoral as long as the postorbital length of the head, and extends to nearly or quite above the commencement of the anal; ventral about 1/3 as long as pectoral. *Scales*—the plate-like ones on the upper surface of the head rather large, 13 rows between the snout and the base of the dorsal fin, five between the eye and angle of the preopercle: those on the upper surface of the head roughened by lines almost surrounding a central spot, whilst those on the body are arched. *Colours*—purplish-black superiorly, becoming lighter on the sides and beneath: many of the scales on the body with a round black mark. Fins dark, the pectoral in the young yellow in its lower half with a blue basal spot, external to which it has several vertical black bands, dorsal edged with yellow.

Habitat.—Cachar and Assam, in both running and standing water, to about 10 inches in length. The specimen figured (life-size) is from Assam.

8. Ophiocephalus gachua.

Ophiocephalus kora motta, Russell, Fish. Vizag. ii, p. 49.

Ophiocephalus gachua, Ham. Buch. Fish. Ganges, pp. 68, 367, pl. 21, f. 21; Bleeker, Beng. en Hind. p. 42; Günther, Catal. iii, p. 471; Kner, Novara Fische, p. 233; Day, Fish. Mal. p. 149; Peters. Monats. Akad. Berlin, 1868, p. 262, (var. *Malaccensis*).

Ophiocephalus cora-motu et *fuscus*, Cuv. and Val. vii, p. 414; Jerdon, M. J. L. and Sc. 1848, p. 146.

Ophiocephalus marginatus, Cuv. and Val. vii, p. 411; Val. in Jacq. Voy. Ind. Ori. pl. 13, f. 2; Jerdon, M. J. L. and Sc. 1848, p. 145.

Ophiocephalus limbatus, Cuv. and Val. vii, pl. 201; Swainson, Fishes, ii, p. 237.

Ophiocephalus montanus, McClell. C. J. N. H. ii, p. 583; Bleeker, Beng. en Hind. p. 42.

Ophiocephalus kelaartii, Günther, Catal. iii, p. 472.

Dheri dhok, Hind.; *Karavu*, Mal.; *Para korava*, Tam.; *Mah korava*, Can.; *Chenga* or *Chayung*, Ooriah; *Doarrah*, Punj.; *Chen-gah*, Assam.

B. v, D. 32-37, P. 15, V. 6, A. 21-23, C. 12, L. l. 40-45, L. tr. $\frac{3-4}{7-6}$.

Length of head $3\frac{1}{2}$ to $4\frac{1}{4}$, of caudal $5\frac{1}{2}$ to 6, height of body 6 in the total length. *Eyes*—diameter 1/6 of length of head, 1 diameter from end of snout, and from $1\frac{1}{4}$ to $1\frac{1}{2}$ apart. The greatest width of the head equals its length behind the eyes, and its height equals 4/9 of its length. The maxilla reaches to below the hind edge of the orbit. *Teeth*—an inner row of widely separated conical ones in the lower jaw, some also on vomer and palatines. *Fins*—pectoral as long as the head behind the eyes, ventral 2/5 length of pectoral. *Scales*—broad and irregular on the summit of the head: four or five rows between the orbit and the angle of the preopercle: 12 between snout and base of dorsal fin. Those on the head roughened by circular lines, which externally are parallel with their outer edge, whilst the lines on the scales of the body are in the form of arches. *Lateral-line*—bends downwards after proceeding about 12 scales. *Colours*—differ materially, according to the water in which they reside: usually greenish, lighter beneath: dorsal, caudal, and anal slate-coloured, with an orange margin: pectoral with a black base, transversely barred (except in some Andaman specimens), and having a slight reddish or orange edge. In the young there is often a large ocellus with a light edge on the last five dorsal rays: caudal barred. Occasionally it is spotted with white, or even orange, (*O. aurantiacus*), Ham. Buch. Fish. Ganges, pp. 69, 368, pl. 23, f. 22.

O. Kelaarti:—Günther divided this Ceylon form from *O. gachua*, "differing from it by its longer caudal fin," (it is $5\frac{3}{4}$ in the total length). Dr. Günther (Zool. Record. 1865, p. 194), observed "*O. Kelaartii* is not the young of *O. gachua* as suggested": which assertion I think is erroneous.

Habitat.—Fresh waters throughout India, Ceylon, Burma, and the Andamans, also near Gwadur on the Meckran coast. This fish is often found thriving at the bottom of wells, and in fact may be taken from the waters of the plains to those in very high elevations. It attains at least 13 inches in length, is very voracious, and may often be captured in little watercourses, into which it has pursued the *Haplochili* and other small fish.

9. Ophiocephalus punctatus, Plate LXXVIII, fig. 1 (*variety*).

Bloch, t. 358; Cuv. and Val. vii, p. 404; Bleeker, Beng. en Hind. p. 42, Jerdon, M. J. L. and Sc. 1848, p. 145; Günther, Catal. iii, p. 469; Kner, Novara Fische, p. 233; Day, Fish. Mal. p. 151.

Ophiocephalus karrouvei, Lacép. iii, p. 552.

Ophiocephalus lata, Ham. Buch. Fish. Ganges, pp. 63, 637, pl. 34, f. 18.

Ophiocephalus Indicus, McClell. Cal. Journ. N. H. ii, p. 583; Bleeker, Beng. en Hind, p. 42.

Ophiocephalus affinis, Günther, Catal. iii, p. 470.

Phool dhok, Hind.: *Korava*, Tam.: *Beli-korava*, Canarese: *Muttah*, Tel.: *Gorissa* and *Gurric*, Ooriah and Assam: *Dulloonga*, Punj.: *Nga-ain*, Mugh.: *Dhoalee*, Sind: *Black caboose*, of Europeans.

B. v, D. 29-32, P. 17, V. 6, A. 21-23, C. 12, L. l. 37-40, L. tr. $\frac{4-5}{9}$ $\frac{9}{6}$.

Length of head $3\frac{1}{3}$ to $3\frac{2}{3}$, of caudal $5\frac{1}{4}$ to $6\frac{1}{4}$, height of body $5\frac{1}{2}$ to 7 in the total length. *Eyes*—diameter 7 to $8\frac{1}{2}$ in length of head, 1 to $1\frac{1}{2}$ diameters from end of snout, and $1\frac{2}{3}$ to 2 apart. The greatest width of the head equals from 3/5 to 4/7 of its length, its height equals half its length. Lower jaw the longer, the maxilla reaches to below or behind the hind edge of the eye. *Teeth*—a posterior row of four or five conical ones in the lower jaw. *Fins*—pectoral equals half the length of the head or even more, and reaches to above the origin of the anal: ventral is 3/4 as long as the pectoral. The dorsal is 2/3 the height of the body, and a little higher than the anal. *Scales*—on the summit of the head large and of irregular shapes: 12 rows between snout and origin of dorsal fin: five rows between the eye and the angle of the opercle. Those which are on the top of the head are roughened in lines which are parallel with their outer edges, but on the body they are more horizontal. *Lateral-line*—with a slight curve above the fourth anal ray. *Colours*—vary with the water they reside in. Back greenish, becoming yellow on the sides and abdomen, with a dark stripe along the side of the head: several bands from the back pass downwards to the middle of the body. Fins spotted, the caudal and the vertical ones with a narrow light edge, and dark basal band: ventrals white or gray. Some have scattered black spots over the body and head, and this appears most common near the sea, and in the breeding season, whilst they are absent from the young.

Those without spots, but having more or less oblique bands,* sometimes short at other times more continuous, have been termed *O. kurrouvei*, Lacép. *O. Indicus*, McClelland, and *O. affinis*, Günther. Jerdon, *l. c.* observed, "I have not seen any spotted in the manner described by authors."

Personally I have found that placing those with spots in an aquarium, these marks have frequently faded away, on the other hand, in some banded ones, spots have appeared subsequent to their confinement in a globe of water. I have taken females (spotted and unspotted) containing well developed ova.

Habitat.—Fresh-waters, generally in the plains, preferring the stagnant to the running. They attain to about a foot or a little more in length. I found a female, in February, contained upwards of 4,700 large besides some small ova. The one figured (life-size) is from Calcutta, and is of purplish colour, due to the brackish water from which it was taken.

Genus, 2—Channa, *Gronovius*.

Differs from Ophiocephalus in being deficient in ventral fins, and having no cæcal appendages.

Geographical distribution.—Ceylon and China.

It is not uncommon in India to find specimens of *Ophiocephalus gachua* having a ventral fin deficient, but I have not observed both wanting.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Channa Orientalis*, D. 34, A. 22, L. l. 41. Dull green, with spots and a barred pectoral fin. Ceylon.

1. Channa Orientalis, Plate LXXVIII, fig. 2.

Channa, Sp. Gronov. p. 135, t. 9, f. 1.
Channa Orientalis, Bl. Schn. p. 496, t. 90, f. 2; Günther, Catal. iii, p. 483.
Channa Indica, Gronov. ed. Gray, p. 100.

B. v, D. 34, P. 14, A. 22, C. 14, L. l. 41, L. tr. $\frac{3\frac{1}{2}-4\frac{1}{2}}{7-6}$, Cæc. pyl. 0.

Length of head $3\frac{2}{3}$ to $4\frac{1}{3}$, of caudal $5\frac{1}{3}$, height of body $6\frac{1}{2}$ to 8 times in the total length. *Eyes*—diameter 1/5 of length of head, 1 diameter from end of snout, and $1\frac{1}{2}$ apart. The greatest width of the head equals its length behind the middle of the eyes, and its height equals half its length. The posterior extremity of the maxilla reaches to behind the orbit. *Teeth*—some enlarged ones in the lower jaw. *Fins*—the pectoral equals the length of the postorbital portion of the head. *Scales*—with longitudinal striated and raised lines. *Colours*—of a dirty greenish superiorly, becoming dull white or brown on the sides and beneath, there appear to be some darkish spots on the body and fins. Pectoral with vertical bars on its basal third.

Habitat.—Fresh-waters of Ceylon. The one figured (life-size) is from the collection in the British Museum.

* I have specimens of an almost uniform colour.

FAMILY, XXXVIII—LABYRINTHICI, *pt.*, *Cuvier.*

Anabantidæ, pt., Richardson; *Spirobranchidæ*, pt., Swainson; *Labyrinthibranchii*, pt., Owen. *Osphromenoidei*, Bleeker.

Branchiostegals from four to six: pseudobranchiæ rudimentary or absent. Gills four. Body compressed, oblong, or elevated. Eyes lateral. Gill-opening rather narrow, the membranes united below the isthmus. Above the third or upper portion of the first branchial arch exists a cavity, in which is contained an elaborate apparatus consisting of thin laminæ of bone, covered by a vascular mucous membrane, and which is employed for respiratory purposes.* The number of dorsal and anal spines variable: ventrals thoracic. Scales ctenoid and of moderate size. Lateral-line interrupted or absent. Air-vessel present or absent. Pyloric appendages when present few.

Professor Peters (Monats. Akad. Berlin, 1868, p. 259) includes *Ophiocephalidæ* and *Luciocephalidæ* in this Family.

Geographical distribution.—Fresh water and estuary fishes of Asia and South Africa. They are capable of living a considerable period out of their natural element, as they are able to respire atmospheric air, either directly or else in solution in water. They consist of both vegetable and animal feeders. are often domesticated and acclimatized in other countries. When domesticated they are subject to considerable variations in form, also in the number of their spines and rays.

Uses.—All are considered as good for eating, some are even reputed to have medicinal stimulating properties, whilst due to their living long after removal from the water, they are capable of being brought to the markets in a fresh and wholesome condition.

SYNOPSIS OF GENERA.

A. Teeth on the palate.

1. *Anabas.* Opercles and preorbital serrated: vomerine teeth. India, Burma, Ceylon, and the East.

B. Fixed teeth in the jaws, palate edentulous.

2. *Polyacanthus.* Dorsal and anal spines numerous: ventrals long: caudal rounded. India and Ceylon.
3. *Osphromenus.* Dorsal spines in varying numbers (2-13), as are also the anal (7-14): outer ventral ray filiform. India, China, and the East.
4. *Trichogaster.* Ventral fin a single filiform ray. India.

Genus, 1—Anabas, *Cuvier.*

Branchiostegals six: pseudobranchiæ absent. Superbranchial organ well-developed.† Branchial arches with toothed tubercles. Mouth rather small. Opercles and preorbital serrated. Teeth villiform in jaws and on the anterior and posterior extremities of the vomer: none on the palatines. Dorsal fin single, the spinous portion of greater extent than the soft: anal spines numerous, but less than those of the dorsal. Scales ctenoid, rather large. Lateral-line interrupted. Air-vessel bifid posteriorly with either extremity produced. Pyloric appendages few or absent.

Geographical distribution.—Fresh water and estuary fishes. They are found from India to the Malay Archipelago and the Philippine Islands. They are most numerous in the Maritime provinces, and the deltas of the larger rivers.

Uses.—The fishes of this genus rarely exceed eight inches in length, but are highly esteemed as nourishing food, whilst owing to their vitality being very great, they can be conveyed alive for long distances. The boatmen on the Ganges carry them in moist earthern pots, killing and cooking them as required. They are rather voracious fishes, readily taking a worm as a bait.

These fishes have been reputed to climb trees, and Lieutenant Daldorf reported having captured one five feet from the ground, from the cleft of a palmira tree, the leaves of which commence from the bottom of its stem. They migrate during the rainy season from pond to pond: and have also been found æstivating during the hot months.

Accidents are constantly occurring, due to native fishermen killing these fishes by breaking their vertebral column by a bite, as is done by sportsmen in Europe by striking their heads against their boot. Whilst the fish is in the fisherman's mouth for this humane purpose (as it is covered by a slimy, slippery secretion), it occasionally slips into his throat, and then owing to its spiny character it cannot be withdrawn without extensive laceration of the patient's month. Although the following treatment may appear somewhat disgusting it is

* Observations on this mode of respiration are deferred until the *Siluridæ* come under consideration.

† The superbranchial organ consists of thin bony laminæ placed one above the other, decreasing in size superiorly, and increasing in number with age. At first the edges of these laminæ are smooth, but as the fish get older they become undulated.

most successful. Should the fish be still alive cut off the projecting or caudal portion, causing it to die of hæmorrhage. When dead the parts easily reached may be removed, but any force being employed is most injudicious. An elastic catheter, if necessary, may be passed past the fish in order to feed the patient, but the decay of the animal is most rapid, whilst a little smell more or less is immaterial to a native of the East.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Anabas scandens*, D. $\frac{17-18}{8-10}$, A. $\frac{9-10}{9-11}$, L. l. 28-32, L. tr. 15-16, Cæc. pyl. 0—3. India and the East.

A. Teeth on the palate.

Anabas scandens, Plate LXXVIII, fig. 3.

Perca scandens, Dald. Trans. Linn. Soc. iii, 1797, p. 62.

Anthias testudineus, Bloch, t. 322.

Amphiprion testudineus et *scansor*, Bl. Schn. pp. 204, 570.

Lutjanus testudo et *scandens*, Lacép. iv, pp. 235, 239.

Sparus testudineus et *scandens*, Shaw, Zool. iv, pp. 471, 475.

Cojus cobojius, Ham. Buch. Fish. Ganges, pp. 98, 370, pl. 13, f. 33; Taylor, Brewsters, Edin. Journ. Sc. 1831, v, pp. 34, 36.

Anabas testudineus, Cuv. Règ. Anim.; Peters. Monats. Akad. Berlin, 1868, p. 259.

Anabas scandens, Cuv. and Val. vii, p. 333, pl. 193 and 205; Cuv. Règ. An. Ill. Poiss. p. 74, f. 1; Swainson, Fishes, ii, p. 237; Cantor, Ann. Nat. Hist. ix, p. 28, and Catal. Malay. Fishes, p. 82; Richards. Ich. China, p. 250; Jerdon, Madr. J. L. and Sc. 1849, p. 144; Bleeker, Verh. Bat. Gen. xxiii, p. 8, and Java, iv, p. 329; Günther, Catal. iii, p. 375; Kner, Novara Fische, p. 217; Day, Fish. Malabar, p. 132.

Anabas spinosus, Gray and Hardw. Ill. Indian Zool. pl. 89, f. 1.

Anabas trifoliatus, Kaup. Wieg. Arch. 1860, p. 124, t. 6, f. A.

Undee-collee, Mal.; *Panni-eyri*, Tam.; *Coi*, Beng. Assam. and Ooriah; *Nya-pri*, Mugh; *Nya-byays-ma*, Burm.; *Karaya* or *Kawhy-ya*, Sing.

B. vi, D. $\frac{17-18}{8-10}$, P. 15, V. 1/5, A. $\frac{9-10}{9-11}$, C. 17, L. l. 28-32, L. tr. 3-4 | 9-10, Vert. 10/16, Cæc. pyl. 0-3.

Length of head $3\frac{1}{2}$ to $3\frac{2}{3}$, of caudal $5\frac{1}{3}$ to $6\frac{1}{2}$, height of body 3 to 4 in the total length. *Eyes*—diameter $4\frac{1}{2}$ to 5 in length of head, 3/4 to 1 diameter from end of snout, and from $1\frac{3}{4}$ to 2 apart. The greatest width of the head nearly equals its height, or its length excluding the snout. Lower jaw slightly the longer, the maxilla reaches to beneath the middle of the orbit. Preorbital strongly denticulated, the anterior four or five denticulations are directed more or less forwards, and the front one is the longest: posterior edge of opercle, also of sub- and inter- opercles strongly spinate, shoulder scale generally with two or three denticulations. *Teeth*—villiform in the jaws, with the outer row rather the largest; a small patch on the front end of the vomer, which are slightly obtusely conical but small, none on the palatines. *Fins*—the length of the base of the spinous portion of the dorsal fin is 5/6 of that of the length of its entire base, soft portion higher than the spinous. *Scales*—three entire and two half rows between the lateral-line and the commencement of the base of the dorsal fin, some over soft dorsal, caudal, anal, and base of pectoral. *Lateral-line*—interrupted about the seventeenth scale. *Cæcal appendages*—usually three, but I took some specimens in Madras which were destitute of any. *Colours*—rifle green, becoming lightest on the abdomen. During life there are usually four wide vertical body bands, and a dark stripe from the angle of the mouth to the preopercle. The *young* have a black blotch on the side of the base of the tail, surrounded by a light, sometimes yellow, ring; usually they have a black spot at the end of the opercle, and sometimes another at the base of the pectoral.

Variety.—I obtained in the Ganjam district a specimen of this fish of an orange colour, which the fishermen asserted was not an uncommon occurrence and not depending solely upon the water the fish resided in. At the present time, after it has been nearly ten years in spirit, the orange colour is visible.

Anabas oligolepis, Günther (? Bleeker) Catal. iii, p. 376, from Ceylon and India, is considered to differ as having D. $\frac{16-18}{8}$, L. l. 27. I have specimens from India which have only 28 large scales along the lateral-line, and two in the Calcutta Museum have D. $\frac{16}{8}$, L. l. 26, and it appears to me that a regular gradation exists from that number to 32.*

This fish being extensively employed for stocking ponds, considerable differences are found as to its proportions, the Bengal forms as a rule being rather more elongated than those of Madras.

Habitat—Estuaries and fresh waters of India, Ceylon, and Burma, to the Malay Archipelago and Philippines. The one figured is from Calcutta. They attain at least $8\frac{1}{2}$ inches in length. The breeding season is about June and July.

* It is a subject deserving extended investigation, as to how far the number of spines and rays of the dorsal and anal fins differ in each species of Indian fresh water Acanthopterygian fishes. A rather wide latitude exists in *Anabas*, *Polyacanthus*, *Trichogaster*, *Osphromenus*, and *Ophiocephalus*, and to a lesser extent in *Etroplus*. The number of scales along the lateral-line seems also to be subject to variation in *Polyacanthus*, whilst in *Ophiocephalus* in some the number appears constant between the lateral-line and first dorsal spine (as *O. micropeltes*, *O. Stewartii*, and *O. gachua*), in others inconstant (as *O. marulius*, *O. leucopunctatus*, and *O. striatus*).

B. Fixed teeth in jaws, palate edentulous.

Genus, 2—Polyacanthus, *(Kuhl.* and *v. Hass.) Cuv. and Val.*

Branchiostegals six: pseudobranchiæ glandular or absent. Body oblong, compressed. Mouth, small and but little protractile. Opercles spineless. Teeth small and fixed in the jaws, palate edentulous. Dorsal fin single, the spinous portion of much greater extent than the soft: the anal of a similar description: ventral with one spine and five well-developed rays, some of which are usually elongated. Scales rather large, ctenoid. Lateral-line interrupted, and may be partially or even entirely absent. Air-vessel simple. Pyloric appendages, when present, few.

Geographical distribution.—Fresh waters and estuaries along the coasts of India and Ceylon, but usually not far inland. Occasionally, according to Dr. Jerdon, wounds from their spines inflict a most severe burning pain, which lasts for two or three hours.

Uses.—Although their size is minute, the lower classes of the natives employ them for food.

SYNOPSIS OF SPECIES.

1. *Polyacanthus cupanus*, D. $\frac{14-16}{5-7}$, A. $\frac{16-19}{10-11}$, L. l. 29-32, L. tr. $\frac{4}{7-8}$. Greenish, barred, having a scarlet ventral ray. India.

2. *Polyacanthus signatus*, D. $\frac{16-17}{8-10}$, A. $\frac{14-16}{10-12}$, L. l. 29, L. tr. 4/9. Olive. Ceylon and Java.

1. Polyacanthus cupanus, Plate LXXVIII, fig. 4.

Cuv. and Val. vii, p. 357; Günther, Catal. iii, p. 381; Kner, Novara Fische, p. 218; Day, Fish. of Malabar, p. 134,

Caringanah and *Wunnuttee*, Mal.: *Punnah*, Tam.: *Ta-but-ti*, Can. and Mal.: *Heb-bu-ti*, Tel.

B. vi, D. $\frac{14-17}{5-7}$, P. 10, V. 1/5, A. $\frac{16-19}{9-11}$, C. 13, L. l. 29-32, L. tr. $\frac{4}{7-8}$.

Length of head 1/4 to 1/5, of caudal nearly 1/4, height of body 1/4 of the total length. *Eyes*—diameter 1/4 to 1/5 of length of head, 1 diameter from end of snout and apart. Preorbital serrated. Posterior half, and the angle of the preopercle finely serrated, as are also the sub-opercle and posterior half of the inter-opercle. *Teeth*—cardiform in jaws, none on vomer or palatines. *Fins*—dorsal spines not so high as the rays, the soft dorsal and sometimes the anal rather elongated, caudal wedge-shaped. *Lateral-line*—in the form of a single round hole in each scale, has three entire and two half rows of scales between it and the base of the first dorsal spine, it ceases about the fourteenth scale. *Colours*—rifle-green, with the prolonged ventral ray scarlet: caudal barred in spots, as is also the dorsal more especially in its soft portion: a round dark spot at the base of the caudal, and numerous small ones on the head. *Variety*—rose-coloured with two horizontal black bands,* one from above the orbit to the upper part of the caudal fin, the second from the angle of the mouth through the eye to the lower part of the same fin: head and cheeks spotted. The colour reminds one of the young of the *Ophiocephalus micropeltes* (see page 365), and appears somewhat to resemble *P. Deissneri*, Bleeker.

Habitat.—Malabar and Coromandel coasts, often found in ditches, paddy fields, and shallow waters, generally within or not far removed from tidal influence, but I have likewise taken it in the Bowany at Mettapolliam and also along the base of the ghauts in Canara. It lurks under stones, or amongst weeds, and becomes very tame in an aquarium. It grows to about three inches in length.

2. Polyacanthus signatus.

Günther, Catal. iii, p. 379.

B. vi, D. $\frac{16-17}{8-10}$, P. 11, V. 1/5, A. $\frac{14-16}{10-12}$, C. 14, L. l. 29-32, L. tr. 4/9, Vert. 10/16.

Length of head $3\frac{3}{4}$ to $4\frac{1}{4}$, of caudal $3\frac{1}{2}$ to 4, height of body $3\frac{1}{3}$ to $3\frac{1}{2}$ in the total length. *Eyes*—diameter $4\frac{1}{2}$ to 5 in the length of head, 1 diameter from end of snout, and 1 apart. Lower edge of preorbital very finely serrated: angle of preopercle finely serrated, the other opercles entire. The maxilla reaches to below the front edge or first third of the eye. *Teeth*—villiform, the outer row in the jaws rather enlarged, some specimens have a caniniform tooth on either side of the middle of the lower jaw. *Fins*—dorsal spines stout, rather short, increasing in length to the last: soft portions of the dorsal and anal elongated and pointed due to the prolongation of their central rays: outer ventral ray prolonged into two filaments. Caudal with its central rays the longest. *Lateral-line*—sub-interrupted. *Colours*—reddish olive in spirit: probably greenish during life: a round blackish spot on the middle of the base of the soft dorsal.

Habitat.—Ceylon and Java, attaining at least 5 inches in length.

Genus, 3—Osphromenus, *(Commerson) Lacépède.*

Trichopus, Lacép.: *Ctenops*, McClelland: *Trichopsis*, Kner.

Branchiostegals, six. Body, moderately elevated, compressed. Opercle without a spine: opercular pieces serrated in the immature. A superbranchial organ. Mouth small, oblique, protractile. Small and fixed teeth in

* These bands appear to be mostly seen in the young in the Canara district, whilst their cheeks have well marked black spots.

the jaws, none on the palate. One dorsal fin, its spinous portion sometimes in excess (2-14) but generally less in extent than its soft part. Anal spines in varying numbers (5-14). Outer ventral ray long, filiform, the remainder being generally rudimentary. Scales ctenoid, and of moderate size. Lateral-line, when present, uninterrupted. Air-vessel present. Pyloric appendages two.

Geographical distribution.—One species has been introduced into India: and another is found in Assam, N.E. Bengal, Sikkim, and Nepal. The imported species, *O. olfax*, is of excellent flavour, attaining to 20lbs. or upwards in weight, well adapted for pisciculture, and capable of being extensively spread in tropical and extra-tropical regions. It has been naturalized in the Mauritius and Cayenne: in 1864 some were imported into Australia, and in 1866 into Madras and on to the Neilgherry hills. Commerson who observed it in the Mauritius in 1770, states that he never eat any fish more exquisite in flavour whether from the sea or fresh water: he also added that in Batavia the Dutch reared them in large earthen pots, changing the water daily and feeding them on nothing but fresh water plants, especially the *Pistia natans*.

General Hardwicke (Zool. Journ. iv, p. 309), gives an account of the breeding of this fish, apparently monogamous: he observes, they commence at six months of age, whilst their fecundity is astonishing. During the breeding season they frequent the sides of tanks, where shelter is afforded them by the grasses and weeds growing in the water. For several days they are very active, passing in and out of their grassy cover, and in some places thickening it, by entangling all trailing shoots, and forming what is generally considered the spot under which the ova are deposited. They continue to watch this place with the greatest vigilance, driving away any interloping fish, and at the end of a mouth numerous fry appear, over which the old gouramies keep watch many days.

Uses.—As already observed they are excellent as food, but must not be allowed access to foul substances or they will consume them, and may thus be rendered unwholesome.

SYNOPSIS OF SPECIES.

1. *Osphromenus olfax*, D. $\frac{11-14}{11-12}$, A. $\frac{9-12}{19-21}$, L. l. 30-38, L. tr. $\frac{5-8}{13}$, China, fresh waters of the Malay Archipelago, introduced into the Mauritius, Cayenne, and India.

2. *Osphromenus nobilis*, D. $\frac{5-6}{7-8}$, A. $\frac{5}{23-25}$, L. l. 28-31, L. tr. $\frac{6}{12}$. Brown, with three irregularly interrupted silvery longitudinal bands. N.E. portions of Bengal and Assam.

1. **Osphromenus olfax**, *Commerson*, Plate LXXIX, fig. 6.

Osphromenus gourami, Lacép. iii, p. 117, pl. iii, f. 2.

Trichopodus mentum, Lacép. iii, p. 125, pl. iii, f. 3.

Trichopus gourami and *satyrus*, Shaw, Zool. iv, pp. 388, 391, pl. 55.

Osphromenus olfax, Hard. Zool. Journ. iv, p. 309, pl. 36; Cuv. and Val. vii, p. 377: Swainson, Fishes, ii. p. 236; Richards. Ich. China, p. 251; Bleeker, Verh. Bat. Gen. xxiii, p. 10; Cantor, Catal. p. 88; Günther, Catal. iii, p. 382; Peters, Monat. Akad. Berlin, 1868, p. 260.

Osphromenus gourami, Cuv. and Val. vii, p. 377, pl. 198 (*immature*).

B. vi, D. $\frac{11-14}{11-12}$, P. 15, V. 1/5, A. $\frac{9-12}{19-21}$, C. 16, L. l. 30-38, L. tr. $\frac{5-8}{13}$, Vert. 12/18-19.

Length of head 1/4, caudal 1/5, height of body 1/3 of the total length. *Eyes*—diameter about 1/4 of length of head, $1\frac{1}{3}$ diameters from end of snout and 2 apart. Body oblong, elevated and compressed, the abdominal profile more convex than the dorsal, and a slight concavity over the orbit. The posterior extremity of the maxilla extends to beneath the anterior edge of the orbit. In the *immature* the preorbital finely and evenly serrated, as is also the lower margin of the preopercle. *Fins*—dorsal spines increasing in length and strength to the last, the sixth and seventh rays the longest: first or second anal ray sometimes produced in the immature: pectoral and caudal rounded: first ventral ray reaches the base of the caudal. *Colours*—greenish-brown, becoming lighter on the abdomen: four or five vertical bands extend from the back to the abdomen in the immature: a reddish-brown tinge on the lower surface of the head and chest: base of pectoral fin black in the young; where glands open on the head there are black spots or stars.

Habitat.—China, and fresh waters of the Malay Archipelago. *Naturalized* in Mauritius, Cayenne, Australia, and introduced into some parts of India, viz. near Calcutta, Madras, and the Neilgherries. Attains 20 lbs. or more in weight and is excellent eating when kept in clean water. The specimen figured is one from the Neilgherry hills, and is $11\frac{1}{2}$ inches in length.

2. **Osphromenus nobilis**, Plate LXXVIII, fig. 5.

Ctenops nobilis, McClelland, Cal. Journ. Nat. Hist. v, p. 281, pl. 21, f. 1.

Trichopodus nobilis, Cantor, Malayan Fishes, p. 91.

Osphromenus nobilis,* Day, Proc. Zool. Soc. 1869, p. 519.

B. vi, D. $\frac{5-6}{7-8}$, P. 12, V. 1/5, A. $\frac{5}{23-25}$, C. 16, L. l. 28-31, L. tr. 6/12, Cæc. pyl. 2.

* Dr. Günther recorded: "*Osphromenus.* Surgeon Day describes what he states to be the *Ctenops nobilis* of McClelland," (Zool. Record, 1869, p. 133). The only specimen of this fish which I have seen in any Continental Museum was at Berlin, it had been received in exchange from the British Museum as "*Osphromenus olfax*, young, India."

Length of head $3\frac{1}{2}$ to 4, of caudal 4 to $4\frac{1}{2}$, height of body 3 to $3\frac{1}{4}$ in the total length. *Eyes*—diameter $3\frac{1}{2}$ in length of head, $1\frac{1}{4}$ diameters from end of snout, and also apart. Body compressed: head acute, rather depressed, with the lower jaw the longer. The posterior extremity of the intermaxillaries reaches to opposite the front edge of the eye, the maxilla 4/5 of the same distance. Preorbital rather large and coarsely serrated, as is also the lower edge of the preopercle. *Teeth*—villiform, with some rather enlarged ones in the jaws. *Fins*—dorsal small, and situated in the posterior third of the length of the body. Pectoral rather above half the length of the head. Outer ventral ray prolonged in some specimens. Anal commences from close behind the end of the ventral spine and is continued almost to the caudal, from which it is separated by a notch, its spines increase in length posteriorly. *Scales*—ctenoid, extending over the bases of the vertical fins. *Lateral-line*—when present in the form of a simple orifice in the centre of each scale: occasionally it becomes more tubular towards the caudal region. An accessory cavity to the gills exists above and behind the branchiæ. *Colours*—brown, a silvery white band, usually interrupted, passes from the eye to the centre of the base of the caudal fin, a second similar one extends from the pectoral along the side, and a third at the base of the anal. Sometimes there is a black light-edged ocellus at the upper part of the base of the caudal fin.

Habitat.—Rivers of N. E. Bengal and Assam, extending into those of the hills. It attains at least 4 inches in length. The one figured (life-size) was from Assam.

Genus, 4—Trichogaster, *Bl. Schn.*

Colisa, Cuv. and Val.

Branchiostegals five, branchial arches with toothed tubercles. Opercle entire: preopercle usually serrated. Cleft of mouth small, jaws little protractile. A single dorsal fin, the spinous portion more developed than the soft: anal similar, but of greater extent. Ventral consisting of a single elongated filiform ray. Teeth small in the jaws, vomer and palatines edentulous. Lateral-line, when present, interrupted. Air-vessel divided posteriorly into two portions. Pyloric appendages few. Intestines with many convolutions.

The numbers of the spines and rays in both the dorsal and anal fins are subject to considerable variation in the species of this genus, whilst the character of the caudal is not invariably identical in all specimens of the same species. The sub-opercle may be serrated or entire in the same species. The lateral-line has been said to be present in some, absent in others: on this however undue stress has been laid. In examining 20 well-marked, banded *Trichogaster chuna's*, it was found as follows:—in some anteriorly in the form of well-marked tubes, or else they were moderately developed: in others the tubes were absent or represented by a circular spot in the centre of the scale. The tube being the most highly developed form, when less so the round orifice which even may be entirely absent, and as all these three varieties are found in *T. chuna*, the character of the lateral-line can hardly be considered a sufficient diagnostic distinction for species.

Geographical distribution.—Large rivers and waters in their vicinity throughout Sind, the Punjab, N. W. Provinces, Bengal, Assam, and Burma, but appear to be absent in India, south of the Kistna river throughout the Madras Presidency, along the western coast, and Ceylon.

Although Bloch and Cuv. and Val. remark upon the existence of these fishes at Pondicherry and Tranquebar, I cannot help thinking some error as to locality has been recorded. The late Dr. Jerdon informed me that he had never seen any in southern India, the Madras Museum does not possess any, and I have searched in vain for specimens at the two localities given above, where the native fishermen were unacquainted with any fishes resembling the coloured drawings of a *Trichogaster*.

Ham. Buch. distinguishes the following six species of *Trichogaster*:—*colisa*, *bejeus*, *cotra*, *lalius*, *sota*, and *chuna*. His MS. figure of *bejeus* is however so similar to his published *colisa*, as to leave but little doubt that the two are varieties of one species, the former is said to have D. $\frac{17}{8}$, A. $\frac{19}{18}$, the latter to possess D. $\frac{16}{11}$, A. $\frac{17}{17}$. The *T. cotra* is stated to have D. $\frac{17}{8}$, A. $\frac{19}{16}$, and appears to be the young of the first species. *T. lalius* seems to be a well marked form, whilst *T. sota* may be a variety of the black banded *T. chuna*.

SYNOPSIS OF SPECIES.

1. *Trichogaster chuna*, D. $\frac{17-18}{7-8}$, A. $\frac{17-20}{11-15}$. Caudal slightly emarginate. A dark or black band from the eye to the caudal fin. Bengal and Assam.

2. *Trichogaster labiosus*, D. $\frac{17}{9}$, A. $\frac{17-18}{18}$. Lips very thick and covered with papillæ as in *Labeo*. Soft dorsal elongated and pointed. Eight or ten bands on the sides. Burma.

3. *Trichogaster fasciatus*, $\frac{15-17}{9-13}$, A. $\frac{15-18}{14-19}$. Caudal notched or cut square. Body banded. Large rivers of Sind, India, and Burma, except Madras, south of the Kistna.

4. *Trichogaster lalius*, D. $\frac{15-17}{7-8}$, A. $\frac{17-18}{13-14}$. Vertical fins densely scaled. Vertically banded with scarlet and azure blue bands. Indus, Ganges, and Jumna rivers.

1. **Trichogaster chuna**, Plate LXXIX, fig. 3.

Trichopodus chuna, Ham. Buch. Fish. Ganges, pp. 121, 372.
Colisa chuna, Cuv. and Val. vii, p. 368.
Trichogaster chuna, Day, Proc. Zool. Soc. 1869, p. 520.
Bah-say-lee or *Bainsa-saylee*, Assam.

B. v, D. $\frac{17-18}{7-8}$, P. 9, V. 1, A. $\frac{17-20}{11-15}$, C. 15, L. l. 27-29, L. tr. 5/10.

Length of head from $3\frac{1}{2}$ to 4, of caudal $4\frac{1}{4}$ to $4\frac{3}{4}$, height of body $2\frac{1}{2}$ to $2\frac{3}{4}$ in the total length. *Eyes*—diameter $2\frac{3}{4}$ to 3 in length of head, 1/2 to 3/4 of a diameter from end of snout, and 1 apart. Preorbital and lower edge of preopercle serrated. Maxilla reaches to below the front nostril. Profile very slightly concave over orbits: snout obtuse. *Fins*—dorsal fin commences midway between end of snout and base of first ray, its spines increasing in length to the last, which equals the postorbital length of the head, and is 2/3 as high as the soft dorsal which is longest in its middle. Pectoral as long as the head. The ventral ray reaches to the posterior extremity of the anal. Caudal slightly emarginate. *Scales*—ctenoid, about 19 rows between first dorsal spine and the snout, they are but slightly extended over the soft portion of the anal fins and form a short sheath for the spines. *Lateral-line*—present. *Colours*—of a dull greenish, becoming lighter along the abdomen: a dark, sometimes black, band from the eye along the side to the lower half of the base of the caudal fin. A dark band in the upper third of the dorsal fin, and another on the back along the base of that fin: anal banded similarly to the dorsal, and likewise with a dark band along the bases of its soft portion. Caudal sometimes with a black spot at its base, whilst its last third is rather dark, occasionally with two or three transverse bands.

Out of 20 specimens seven had 18, the remainder 17 dorsal spines: of the anal spines, five had 20, ten had 19, three had 18, and two had 17; those captured nearest the sea had, as a rule, the most spines.

Habitat.—The Brahmapootra from Upper Assam at Debrooghur to the Hooghly at Calcutta. It is termed "*Chuna kholisha* at Goalpara," (H. B. MSS.). The *Trichopodus sota*, H. B. Fishes of Ganges, p. 120, appears to be a variety of this species, and is termed "*Bilk songtak* and *kalak* at Goalpara," (H. B. MSS.) Out of 20 specimens the largest is 1·8 inches in length.

2. **Trichogaster labiosus**, Plate LXXIX, fig. 4.

B. v, D. $\frac{17}{9}$, P. 10, V. 1, A. $\frac{17-18}{18}$, C. 15, L. l. 30, L. tr. 5-6/12.

Length of head $4\frac{1}{4}$, of caudal $4\frac{1}{3}$, height of body $2\frac{2}{3}$ to $3\frac{1}{4}$ in the total length. *Eyes*—diameter $3\frac{1}{2}$ in length of head, 1 diameter from end of snout, and $1\frac{1}{2}$ apart. Preorbital denticulated. Preopercle very slightly rounded at its angle, its lower limb rather strongly serrated: sub-opercle when serrated very slightly so. Maxilla reaches to below the anterior nostril. Lips very thick and covered with papillæ (as in *Labeo*). *Teeth*—present in the jaws. *Fins*—dorsal spines increase in length to the last, which is 2/5 of that of the head, soft dorsal pointed, its third to fifth rays being elongated, and from two to three times as long as the last spine. Anal commences below the base of the pectoral, its soft portion elongated, but not to so great an extent as the soft dorsal. Caudal wedge-shaped, the central rays being the longest. *Scales*—a few over the base of the anterior anal spines, increasing in number posteriorly, whilst the soft portion of the fin is densely scaled: fewer scales on soft dorsal. *Colours*—greenish superiorly, becoming lighter beneath, from eight to ten obliquely vertical dark bars on the sides. A light yellowish red band proceeds from the eye across the lower jaw behind the lip, whilst posteriorly it has a dark edge. Fins dark, outer edge of anal yellowish-red.

Habitat.—Burma, found in the Irrawaddi at Rangoon, and certainly as high as Mandalay. The specimen figured (life-size) is from Rangoon.

3. **Trichogaster fasciatus**, Plate LXXVIII, fig. 6.

Trichogaster fasciatus, Bl. Schn. p. 164, t. 36; Günther, Catal. iii, p. 387; Day, Proc. Zool. Soc. 1869, p. 520.

Trichopodus colisa, *bejeus*, and *cotra*, Ham. Buch. Fish. Ganges, pp. 117, 118, 119, 120, pl. 15, f. 40; Taylor, Brews. Edin. Journ. Sc. 1831, v. pp. 34, 37.

Colisa vulgaris, *bejeus*, *cotra*, and *Ponticeriana*, Cuv. and Val. vii, pp. 362, 365, 366, 370, pls. 196, 205.

Polyacanthus fasciatus, Cuv. and Val. vii, p. 369.

Colisa vulgaris, Swainson, Fishes, ii, p. 235; Bleeker, Verh. Bat. Gen. xxv, Beng. en Hind. p. 94.

Colisa fasciata and *Ponticeriana*, Jerdon, M. J. L. and Sc. 1848, p. 145.

Kussuah and *Coilia*, Ooriah; *Ponundi*, Tel.; *Kun-gee*, Punj.; *Pich-ru*, Sind.; *Koh-lee-hona*, Assam.; *Nga-pin-thick-kouk* and *Nga-phyin-thaleb*, Burm.

B. v, D. $\frac{15-17}{9-13}$, P. 10, V. 1, A. $\frac{15-18}{14-19}$, C. 15, L. l. 29-31, L. tr. $\frac{4\frac{1}{2}-5\frac{1}{2}}{11-12}$, Cæc. pyl. 2.

Length of head $3\frac{3}{4}$ to $4\frac{1}{4}$, of caudal $4\frac{1}{2}$ to $5\frac{1}{2}$, height of body $2\frac{2}{3}$ to $3\frac{1}{4}$ in the total length. *Eyes*—diameter $3\frac{1}{4}$ to $3\frac{1}{2}$ in length of head, 3/4 to 1 diameter from end of snout, and $1\frac{1}{2}$ to $1\frac{3}{4}$ apart. Preorbital denticulated in the young, only its lower edge in the middle aged, whilst in the adults it may be entire: lower limb of preopercle serrated, and sometimes a few serratures on the sub-opercle. *Fins*—dorsal spines of moderate strength, the last the longest and equal to the postorbital length of the head, the soft portion in some is rounded, in others more pointed and even 1/4 longer than the last spine, soft anal resembles the soft dorsal: caudal notched or cut square. *Scales*—there are few on the vertical fins of Assam specimens, more on those from Calcutta or Ganjam. *Colours*—superiorly greenish, becoming dirty white below: a green spot on either gill cover: eyes red: fourteen or more orange bands descend obliquely downwards and backwards from the back to the abdomen: ventral fin edged with red and variegated with black, green, and white: dorsal and caudal fins spotted with orange. Immature specimens with a black spot at the root of the caudal fin.

The Assam variety has higher dorsal spines and a more pointed soft dorsal and anal fin, which are likewise less scaled, than in those from Calcutta.

18 Assam specimens—1 had 17, 13 had 16, 4 had 15 dorsal spines; 3 had 17, 10 had 16, 5 had 15 anal spines.
4 Calcutta ,, — 1 ,, 16, 3 ,, 15 ,, ,, ; 1 ,, 17, 2 ,, 16, 1 ,, 15 ,, ,,
4 Ganjam ,, —2 ,, 17, 2 ,, 16 ; 1 ,, 18, 3 ,, 17 ,, ,,

The Assam variety appears to be *T. bejeus*. H. B., and is *T. fasciatus*, var. Playfair, (P. Z. S. 1867, p. 15) from Cachar. *T. cotra*, H. B. (*Sada kholisha*, Goalpara, H. B. MSS.) may be the young, it is said not to exceed 2 inches in length, and to have transverse blue bars on the sides. D. 17 | 18, A. 19 | 16.

Habitat.—The Coromandel coast as far south as the river Kistna, the estuaries of the Ganges, Cachar, and Assam, Punjab, N. W. Provinces, and Sind, British and upper Burma: attaining to 5 inches in length.

It is dried in places in India, whilst in Burma it is frequently made into Ngapee.

4. Trichogaster lalius, Plate LXXIX, fig. 5.

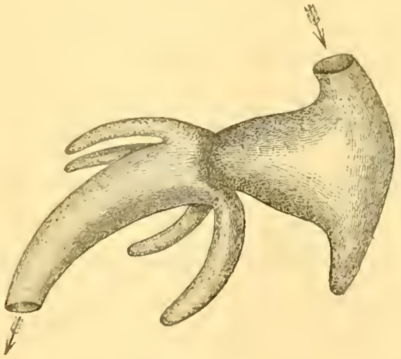
Trichopodus lalius, Ham. Buch. Fish. Ganges, pp. 120, 372.
Colisa lalius, Cuv. and Val. vii, p. 366.
Colisa unicolor, Cuv. and Val. vii, p. 368.
Trichogaster unicolor, Günther, Catal. iii, p. 388.
Trichogaster lalius, Day, Proc. Zool. Soc. 1869, p. 520.
Kung-gee, Punj.

B. v, D. $\frac{15-16}{7-8}$, P. 10, V. 1, A. $\frac{17-18}{13-14}$, C. 15, L. l. 26-28, L. tr. $4\frac{1}{2}$-$5\frac{1}{2}$/10.

Length of head $3\frac{1}{3}$ to $3\frac{1}{2}$, of caudal $4\frac{1}{2}$ to $5\frac{1}{4}$, height of body $2\frac{1}{3}$ to $2\frac{3}{4}$ in the total length. *Eyes*—diameter $3\frac{1}{4}$ to $3\frac{1}{2}$ in length of head, 3/4 of a diameter from end of snout, and 1 apart. Profile over eyes rather concave. Preorbital denticulated: lower limb of preopercle serrated, sub-opercle entire. *Teeth*—present in jaws. *Fins*—dorsal spines increase in length to the last, the soft dorsal and anal rounded, not produced. Caudal rounded, in large specimens cut square, or even very slightly notched. *Scales*—covering the soft dorsal, and very densely the soft portion of the anal, they form a high sheath to the anal spines. *Colours*—vertically banded with scarlet and light blue, half of each scale being of either colour. Dorsal and caudal fins barred in scarlet dots. Anal with a dark band along its base, and a red outer edge.

In the cold season at Calcutta these lovely little fishes are often sold alive in bottles of water, and they thrive pretty well in an aquarium. The specimens of *T. unicolor* at Paris appear to belong to this species.

Habitat.—Ganges and Jumna rivers, very common at Calcutta, also in Sind: it attains nearly 2 inches in length. It is termed "*Lal kholisha* at Goalpara," (H. B. MSS.)



STOMACH AND CÆCAL APPENDAGES OF *Chrysophrys datnia*.

The above woodcut was accidentally omitted at p. 140, it is intended to show the cæcal appendages of a specimen (Plate XXXIV, fig. 1) captured at Calcutta. Bleeker, Revis. Sparoids (1876) considers the *C. datnia* and *C. hasta* as distinct species, but he appears to have figured the one I have termed *C. datnia* as *hasta*, and my *C. berda*=*C. hasta* as *datnia*. *C. Schlegeli* he likewise places as a distinct species, which appears to correspond with *C. calamara* (variety). Doubtless there are two, perhaps three, closely allied species, however the only form I have taken at Calcutta is that figured, which I think agrees with H. Buchanan's type captured at the same place.

FAMILY, XXXIX—TRACHYPTERIDÆ, *pt.*, *Swainson.**

Tœnioidei, pt. Cuv.: *Gymnetridæ*, pt. Swainson.

Branchiostegals six: pseudobranchiæ present. Body elongated, and strongly compressed. Gill openings wide: gills four. Eyes lateral. Cleft of mouth slight. Dentition feeble. A single dorsal fin occupying the whole of the back, having a detached anterior portion, the whole composed of rays that are neither branched nor articulated: anal absent: caudal not in the longitudinal axis of the fish, or else rudimentary: ventrals thoracic. Scales absent. Pyloric appendages numerous. Vertebræ many. Bones soft.

Genus, 1—REGALECUS, *Brünn.*

Gymnetrus, Bl. Schn.

Definition as in the family, likewise the ventral in the form of a single filament with a dilated extremity. Caudal fin, if present, minute.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. D. 4-5/320. Silvery. Coromandel coast of India.

1. Regalecus Russellii, Plate LXXIX, fig. 2.

Gymnetrus, Russell, Fish. Vizag. i, p. 28, pl. xl.
Gymnetrus Russellii, Shaw, Zool. iv, p. 195, pl. 28; Cuv. and Val. x, p. 377.
Xiphicthis Russellii, Swains. Fishes ii, p. 46; Jerdon, M. J. L. and Sc. 1851, p. 139 (not synom.)
Regalecus russellii, Günther, Catal. iii, p. 311.

B. v, D. 4-5/320, P. 11, V. 1, C. 4.

Body lanceolate, sword form, smooth, without scales. Mouth small, oblique, jaws extractile, the upper slightly the longer. *Teeth*—absent. *Fins*—four or five rays on the head at first distinct, subsequently uniting and forming a long filament: second dorsal extends from the neck to near the caudal fin, the central rays the longest. Pectoral short. Caudal distinct from the dorsal, consisting of four rays united into one filament. *Scales*—absent. *Colours*—a pale silver, but the silvering comes off upon handling: dorsal fin with a dark edge.

The fish described and figured by Russell was captured on the outside of the surf at Vizagapatnam, March, 1788, and does not appear to have been subsequently observed.

Habitat—Vizagapatnam, grows to two feet eight inches in length. The figure is after Russell.

* Swainson, 1839 (Fishes ii, p. 47) instituted this family: Günther, 1861 (Catal. iii, 300) adopted the same name but omitted any reference to Swainson, as a consequence the nomenclature (see Carus and Gerstaecker, Pisces, p. 546), has been erroneously credited to the latter of those two ichthyological authors.

FAMILY, XL—GLYPHIDODONTIDÆ,* *Cantor.*

Sciænoidei, pt., Cuv.; *Labroidei ctenoidei*, Müller; *Ctenolabridæ*, Owen; *Pomacentridæ*, Günther.

Branchiostegals from five to seven: pseudobranchiæ present. Gills three and a half. Eyes lateral. Body more or less short and compressed. Bones of head variously armed or smooth. Teeth in jaws feeble, palate edentulous: inferior pharyngeal bones coalescing, with or without a median longitudinal suture. Some of the dorsal, anal, and ventral rays unarticulated, forming spines. A single dorsal fin with the spines equal in number to or somewhat less than the rays, very rarely more: the soft anal similar to the soft dorsal, and with two or three spines: ventrals thoracic, with one spine and five rays. Scales ctenoid. Air-vessel present, and destitute of any pneumatic duct. Pyloric appendages few.

Geographical distribution.—Seas of India and tropical seas. A few extending into extra tropical regions.

SYNOPSIS OF GENERA.

1. *Amphiprion.* Opercles and preorbital serrated or denticulated. Teeth in a single row. Indian Ocean and beyond.

2. *Premnas.* Opercles serrated: preorbital armed with one or two spines. Teeth in a single row. Seas of India to the Malay Archipelago and beyond.

3. *Tetradrachmum.* Preopercle serrated, and sometimes the preorbital. Teeth in a villiform band. Red Sea, east coast of Africa, seas of India to the Malay Archipelago and beyond.

4. *Pomacentrus.* Preopercle serrated, and sometimes the preorbital. Teeth in a single row. Red Sea, east coast of Africa, seas of India to the Malay Archipelago and beyond.

5. *Glyphidodon.* None of the opercles serrated. Teeth in a single row. Red Sea, east coast of Africa, seas of India, to the Malay Archipelago and beyond.

6. *Heliastes.* None of the opercles serrated. Teeth conical. Tropical seas, also found in the Mediterranean.

Genus, 1—AMPHIPRION, *Bl. Schn.*

Coracinus, sp. Gronov.; *Prochilus*, (Klein), Cuv.

Branchiostegals five: pseudobranchiæ. All the opercles and preorbital are denticuloted, the teething on the opercle and subopercle being almost spinate. Teeth in the jaws in one row, conical and small. Scales of moderate or rather small size. Dorsal fin with from 9 to 11 spines: anal with two. Lateral-line ceases in a tubular form below the end of the dorsal fin, or is continued lower down in the form of a simple orifice in each scale. Air-vessel present. Pyloric appendages few.

The fishes forming this Genus have as a rule very vivid and decided colouring, vertical bands of a more or less white tint being present in the majority. It appears very probable that some of the species founded on colours, are merely varieties. The caudal fin seems more rounded in the young than in the adults.

Geographical distribution.—Red Sea, east coast of Africa, seas of India to the Malay Archipelago and western portions of the Pacific.

SYNOPSIS OF SPECIES.

1. *Amphiprion ephippium*, D. $\frac{10-11}{17-15}$, A. $\frac{2}{14-15}$, L. l. 50-55, L. tr. 7/18. Dull yellow, with a dark blotch on the side. Andamans to the Malay Archipelago and beyond.

2. *Amphiprion frenatus*, D. $\frac{10-11}{16-17}$, A. $\frac{2}{14-15}$, L. l. 50-55, L. tr. 7/18. Dull yellow, with a dark blotch on the side and a narrow white band from the nape over the opercles. Andamans to the Malay Archipelago and beyond.

3. *Amphiprion Sebæ*, D. $\frac{10-11}{14-15}$, A. $\frac{2}{12-13}$, L. l. 50-55, L. tr. 6/18. Dark, with two white bands, one from nape over opercles, the second from the middle of dorsal fin down the side, it is also continued along the upper third of the soft dorsal. End of free portion of tail and caudal fin yellow. Andamans to the Malay Archipelago and beyond.

4. *Amphiprion Clarkii*, D. $\frac{10}{16}$, A. $\frac{2}{14}$, L. l. 55, L. tr. 6-7/19. Dark, with three white cross bands: snout, chest, pectoral, and caudal yellow. Ceylon to the Malay Archipelago and beyond.

* Müller separated as *Pharyngognathi*, the families having the inferior pharyngeal bones combined as in *Pomacentridæ*, *Labridæ*, and *Chromides*, from the rest of the Acanthopterygians, a division which does not hold good on a more extended investigation. Thus, Genus *Gerres* was found to have these bones as in the Pharyngognathi, but Kner (Wien. Sitz. lviii, p. 301) has observed that *Gerres macrosoma* is an exception, having them separated, and Professor Peters has recorded the same fact in *G. plumieri* and several East Indian species. They are coalesced in some of the *Gobiidæ*, not so in others.

5. *Amphiprion percula*, D. $\frac{10-11}{14-15}$, A. $\frac{2}{11-12}$, L. l. 50-60, L. tr. 7-8/21-23. Yellow, with three white, black-edged cross bands. Pectoral and caudal yellow, with a white edge having a black base. Seas of India to the Malay Archipelago and beyond.

6. *Amphiprion bifasciatum*, D. $\frac{11}{13-15}$, A. $\frac{2}{12-13}$, L. l. 50-55, L. tr. 6/19. Dark, with two milk-white cross bands. Caudal with a white upper and lower edge. Andamans to the Malay Archipelago and beyond.

7. *Amphiprion akallopisus*, D. $\frac{9-10}{20-18}$, A. $\frac{2}{13-14}$, L. l. 60, L. tr. 6/24. Orange, with a blue band from the snout to the dorsal fin: scales on body with a light spot. Andamans to the Malay Archipelago.

1. **Amphiprion ephippium,** Plate LXXX, fig. 1.

Lutjanus ephippium, Bl. iv, p. 121, t. 201, fig. 2; Lacép. iv, pp. 229, 230.

Amphiprion ephippium, Bl. Schn. p. 200; Cuv. and Val. v, p. 386; Schleg. Overz. Amp. &c. Verh. Nat. Gen. Overz. Bezitt. p. 18; Bleeker, Batoe, p. 321; Günther, Catal. iv, p. 10; Day, Proc. Zool. Soc. 1870, p. 695.

Coracinus insignitus, Gronov. Syst. ed. Gray, p. 57.

B. v, D. $\frac{10-11}{17-15}$, P. 19, V. 1/5, A. $\frac{2}{14-15}$, C. 15, L, l. 50-55, L. tr. 7/18, Cæc. pyl. 2.

Length of head $3\frac{1}{2}$ to $3\frac{3}{4}$, of caudal $5\frac{1}{2}$ to $5\frac{1}{3}$, height of body $2\frac{1}{3}$ to $2\frac{2}{3}$ in the total length. *Eyes*—diameter 1/4 of length of head, 1 diameter from end of snout, and $1\frac{1}{4}$ apart. The maxilla reaches to below the first third of the eye. Preopercle serrated, suborbital ring of bones, opercle and sub-opercle denticulated. *Fins*—dorsal spines of moderate strength, and nearly as high as the rays, there being no notch between the two portions: caudal more rounded in the immature than in the adult. *Lateral-line*—the tubular portion ceases after passing along about 36 scales, reappearing some rows lower down in the form of a round hole in each scale. *Colours*—of a dull yellow, with a dark blotch on the side which runs into the general colour, the outer edge of the ventral brown.

Habitat.—Andamans and Nicobars, to the Malay Archipelago and Australia. The specimen, figured life-size, was brought from the Nicobars by the late Dr. Stoliczka.

2. **Amphiprion frenatus,** Plate LXXX, fig. 2.

Brevoort, Amer. Exp. to China and Japan, p. 263, pl. vi, f. 4; Gill, Proc. Acad. Nat. Sc. Phil. 1860, p. 148.

Amphiprion tricolor, Günther, Catal. iv, p. 8; Castelnau, P, Z. S. Vict. ii, p. 92.

B. v, D. $\frac{10-11}{16-17}$, P. 19, V. 1/5, A. $\frac{2}{14-15}$, C. 15, L. l. 50-55, L. tr. 7/18.

The proportions are as in the last species (*A. ephippium*). *Colours*—of a brownish orange hue, becoming lightest on the abdomen and free portion of the tail: a blackish blotch descends from below the last five dorsal spines and first few rays to the middle of the sides. A pearl coloured or bluish band of varying width passes from the nape over the opercles: ventrals externally blackish.

Although I have placed this fish as distinct from *A. ephippium*, it seems not unlikely that it is merely a variety. Amongst the fishes I took at the Andamans were several of the young having the white ocular band, whilst all the adults were without it, being *A. ephippium*. Since then I have seen several adults with the light band, but I am not sure whether such may not be the livery of the immature retained in the adult stage.

Habitat.—Madagascar, Andamans, to the Malay Archipelago, Australia, &c.

3. **Amphiprion Sebæ,** Plate LXXX, fig. 3.

Seba, iii, p. 70, t. 26, f. 24.

Amphiprion Sebæ, Bleeker, Batav. p. 478; Günther, Catal. iv, p. 4.

B. v, D. $\frac{10}{14}\frac{11}{15}$, P. 20, V. 1/5, A. $\frac{2}{12-13}$, C. 15, L. l. 50-55, L. tr. 6/18.

Length of head 4 to $4\frac{1}{4}$, of caudal $5\frac{1}{3}$, height of body $2\frac{3}{4}$ to 3 in the total length. *Eyes*—diameter $3\frac{1}{3}$ in length of head, 1 diameter from end of snout, and also apart. The maxilla reaches to below the front third of the eye. Suborbital ring of bones and preopercle serrated: opercle and sub-opercle denticulated. *Fins*—dorsal spines of moderate strength, increasing in length to the fourth, which equals about 1/3 of the length of the head, posteriorly they decrease so that the fin is deeply notched, soft dorsal 1/3 higher than the spinous. Caudal cut square, or rather emarginate in the adult. *Lateral-line*—interrupted after about the thirty-eighth scale. *Colours*—brownish-black, with two milk-white cross bands, the anterior goes from over the nape to the sub-opercle, touching the orbit anteriorly and covering most of the opercle posteriorly. The second band goes from the three last dorsal spines and four first rays, ending inferiorly a little in front of the vent, superiorly it covers the upper third of the soft dorsal fin: end of free portion of the tail and caudal fin canary-yellow. A young specimen 3/4 of an inch in length had the snout, muzzle, and chest dull yellow, pectoral greenish, its base black.

Habitat.—Andamans to the Malay Archipelago. The specimen figured (life-size) was taken at the Andamans; both it and another of equal size captured at the same time had D. $\frac{11}{11}$.

4. **Amphiprion Clarkii.**

? *Anthias polymnus*, Bloch. t. cccxvi, f. 1.

Anthias Clarkii, Bennett, Fish. Ceylon, p. 29, pl. 29.

Amphiprion xanthurus, Cuv. and Val. v, p. 402; Bleeker, Batav. p. 480; Jerdon, M. J. L. and S. 1851, p. 133; Günther, Catal. iv, p. 5.

Amphiprion Clarkii, Cuv. and Val. ix, p. 504; Peters. in Wieg. Archiv. 1855, p. 265; Günther, Catal. iv, p. 5; Kner, Novara Fische, p. 240.

Amphiprion bicinctus, Rüpp. Atl. p. 139, t. xxxv, f. 1; Cuv. and Val. ix, p. 505; Günther, Catal. iv, p. 8; Playfair, Fish. Zanz. p. 80; Klunz. Fische, d. Roth. Meer. Verh z. b. Ges. Wien, 1871, p. 518.

Amphiprion Japonicus, Schleg. Faun. Japon. Poiss. p. 66.

Amphiprion chrysargus, Richardson, Ich. China, p. 254.

Prochilus clarkii, Bleeker, Bintang, 1868, p. 4.

Prochilus xanthurus, Bleeker, Madagascar, p. 85.

B. v, D. $\frac{10}{16}$, P. 19, V. 1/5, A. $\frac{2}{14}$, C. 15, L. l. 55, L. tr. 6-7/19.

Length of head $4\frac{1}{2}$, of caudal $4\frac{1}{2}$ to $4\frac{3}{4}$, height of body $2\frac{1}{2}$ to $2\frac{2}{3}$ in the total length. *Eyes*—diameter 3 to $3\frac{1}{2}$ in length of head, 1 diameter from end of snout, and $1\frac{1}{4}$ apart. Dorsal profile more convex than the abdominal. Preorbital and suborbital ring of bones denticulated: vertical limb of preopercle likewise serrated: opercle and sub-opercle spinate, also in two distinct patches on the opercle. The maxilla reaches to under the anterior edge of the orbit. *Teeth*—in a single conical row in both jaws. *Fins*—dorsal spines strong and lower than the rays, the fin is scarcely notched: caudal lobed, the upper slightly the longer. *Scales*—some over the soft dorsal and anal fins. *Lateral-line*—tubes cease opposite the posterior extremity of soft dorsal fin. *Colours*—light brown, with three milk-white cross bands, the first passing from in front of the dorsal fin, over the opercles just touching the posterior edge of the orbit, and is continued on to the inter- and sub-opercles: the second, commencing at the base of the last five dorsal spines, passes to the front of the base of the anal fin: the third crosses the free portion of the tail. Snout, chest, pectoral, and caudal yellow.

Habitat.—Red Sea, Ceylon, to the Malay Archipelago and beyond.

5. Amphiprion percula, Plate LXXX, fig. 4.

Anthias polynema, var. Bloch. t. cccxvi, f. 3.

Lutjanus polymnus, var. Lacép. iv, p. 224.

Lutjanus percula, Lacép. iv, pp. 239, 248.

Amphiprion percula, Cuv. and Val. v, p. 397; Bleeker, Amb. and Ceram, p. 287; Schlegel, Overz. Amphip. &c. Verh. Nat. Gen. Ned. Overz. Bezitt. p. 19; Steind. Verh. zool-bot, Ges. Wien, 1861, p. 78; Günther, Catal. iv, p. 7; Kner, Novara Fische, p. 241; Day, Proc. Zool. Soc. 1870, p. 695.

Amphiprion tunicatus, Cuv. and Val, v, p. 399, pl. 132, f. 2; Less. Voy. Coq. Poiss. p. 192, pl. xxv, f. 3.

Amphiprion ocellaris et *melanurus*, Cuv. and Val. v, pp. 399, 400.

Eá-ole-jo-do-dah, Andam. or "Turtle's stomach," because they are generally found inside *Actiniæ*, which are looked upon as those organs.

B. v, D. $\frac{10-11}{14-15}$, P. 17, V. 1/5, A. $\frac{2}{11-12}$, C. 15, L. l. 50-60, L. tr. $\frac{7-8}{21-23}$.

Length of head $3\frac{2}{3}$ to 4, of caudal 4 to $4\frac{2}{3}$, height of body $2\frac{2}{3}$ to 3 in the total length. *Eyes*—diameter $3\frac{1}{2}$ to 4 in length of head, 1 diameter from end of snout, and also apart. Opercle and subopercle strongly denticulated: suborbital ring of bones spinate. The maxilla reaches to below the front edge of the eye. *Fins*—dorsal spines strong, the second to the fourth the highest, but not equalling the soft dorsal. Caudal wedge-shaped or rounded. *Lateral-line*—ceases below about the fourth dorsal ray, and from the thirtieth to thirty-fourth scale. *Colours*—ground colour bright yellow, with three broad milk-white cross bands having a black edging, the anterior being convex, the convexity being forwards over the hind part of the head. The centre one from the middle of the dorsal fin to the vent, and the posterior one over the free portion of tail. Pectoral and caudal deep yellow or brownish yellow, having a broad white edge which has a narrow black base: dorsal and anal yellow with a white edge having a black base: ventral yellow, with a black extremity. In some specimens the posterior white band on the body is continued along either side of the caudal fin.

Habitat.—Seas of India to the Malay Archipelago and beyond. The specimen figured (life-size) is from the Andamans, where it was taken from inside an *Actinia*.

6. Amphiprion bifasciatum.

Anthias bifasciatus, Bloch, t. cccxvi, f. 2.

Amphiprion bifasciatus, Bl. Schn. p. 204; Cuv. and Val. v, p. 392; Schleg. Overz. Amp. in Verh. Nat. Gen. Overz. Bezitt. p. 18; Bleeker, Amb. and Ceram. p. 282; Günther, Catal. iv, p. 3.

Holocentrus bifasciatus, Bl. Schn. p. 567.

Lutjanus jourdin, Lacép. iv, pp. 191, 235.

Amphiprion laticlavius, Cuv. and Val. v, p. 394, pl. 132, f. 1; Swainson, Fishes, ii, p. 217.

B. v, D. $\frac{11}{13-15}$, P. 15, V. 1/5, A. $\frac{2}{12-13}$, C. 17, L. l. 50-55, L. tr. 6/19.

Length of head 4 to $4\frac{1}{2}$, of caudal $4\frac{1}{2}$ to 5, height of body $2\frac{1}{2}$ to $2\frac{3}{4}$ in the total length. *Eyes*—diameter 1/4 of length of head, 1 diameter from end of snout, $1\frac{1}{3}$ apart. Preorbital and preopercle strongly denticulated: preopercle serrated: opercle and subopercle spinate. *Lateral-line*—tubes cease opposite the middle of the soft dorsal. *Colours*—brownish-black, with two milk-white cross bands: the anterior from the nape passes

over the opercles, just touching the posterior edge of the orbit: the second from the last three spines and first few dorsal rays is continued downward to the middle of the body, and backward to the summit of all the dorsal rays: caudal black, with a white upper and lower edge.

It is suggested that *A. intermedius*, Schlegel, is a variety of this species, differing in colour it being brownish, with a curved milk-white band from the nape over the opercle and subopercle: a second from the last few dorsal spines to in front of the base of the anal, it is rather produced superiorly and posteriorly: a third over the free portion of the tail. Fins brownish, edged with black, and tipped with white. In one of the two specimens in the Calcutta Museum, the pectoral has a black extremity with a white edge.

Habitat.—Andamans to the Malay Archipelago and beyond.

7. Amphiprion akallopisus.

Bleeker, Sumatra, ii, p. 281, and Groot Oby. p. 438; Günther, Catal. iv, p. 10.

B. v, D. $\frac{9-10}{20-18}$, P. 19, V. 1/5, A. $\frac{2}{13-14}$, C. 15, L. l. 60, L. tr. 6/24.

Length of head $3\frac{1}{2}$ to $4\frac{1}{4}$, of caudal $4\frac{1}{2}$ to $5\frac{1}{2}$, height of body $2\frac{3}{4}$ to 3 in the total length. *Eyes*—diameter $3\frac{1}{2}$ in the length of head, 1 diameter from end of snout, and also apart. All the opercles and suborbital ring of bones coarsely denticulated. *Fins*—dorsal spines of moderate strength, short, increasing in length to the fourth, a notch between the spinous and soft portions. Caudal rounded. *Colours*—orange, brightest on the head, chest and base of caudal fin: a blue band runs from between the orbit to the dorsal fin where it divides into two, half going along either side of the base of the fin. Scales on body with a light spot.

In a specimen 1·5 inches long from the Andamans the preopercle is entire.

Habitat.—Andamans to the Malay Archipelago.

Genus, 2—Premnas, *Cuv.*

Branchiostegals five or six: pseudobranchiæ. All the opercles serrated: a long strong spine at the posterior edge of the preorbital. Teeth in a single row, conical and small. Dorsal with 9 or 10, anal with 2 spines. Scales of moderate size. The lateral-line ceases below the end of the dorsal fin. An air-vessel. Pyloric appendages three.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Premnas biaculeatus*, Bloch, D. $\frac{9-10}{16-18}$, A. $\frac{2}{13-15}$, L. l. 50-60.

1. Premnas biaculeatus, Plate LXXX, fig. 5.

Chætodon biaculeatus, Bl. t. 219, f. 2.
Lutjanus trifasciatus, Bl. Schn. p. 568.
Holacanthus biaculeatus, Lacép. iv, pp. 528, 537.
Holocentrus Sonneratii, Lacép. iv, pp. 344, 391.
Scorpæna aculeata, Lacép. iii, pp. 258, 268.
Premnas trifasciatus, Cuv. and Val. v, p. 405.
Premnas semicinctus, Cuv. and Val. v, p. 409, pl. 133, f. 1; Swainson, Fishes, ii, p. 217.
Premnas unicolor, Cuv. and Val. v, p. 410.
Premnas biaculeatus, Bleeker, Banda, iii, p. 105; Günther, Catal. iv, p. 10.

B. v, D. $\frac{9-10}{16-18-20}$, P. 19, V. 1/5, A. $\frac{2}{13-15}$, C. 15, L. l. 60-70, L. tr. 14/35, Cæc. pyl. 3, Vert. 12/14.

Length of head 4, caudal $4\frac{1}{2}$, height of body $2\frac{2}{3}$ in the total length. *Eyes*—diameter a little above $3\frac{1}{2}$ to 4 in length of head, 1 to $1\frac{1}{4}$ diameters from end of snout, and 1 apart. Preorbital armed with two strong spines, one of which commences opposite the anterior third of the orbit, the largest below its posterior third, the longest reaches the opercle. Preopercle rounded, its vertical border serrated, as is also the lower edge of the subopercle. *Fins*—fourth dorsal spine longest, and the second of the anal. *Lateral-line*—ceases in a tubular form opposite the third dorsal ray. *Colours*—black or chestnut-brown, fins edged with black. A broad white band margined with black passes over the occiput and on to the opercles and subopercle: a second from the three last dorsal spines to in front of the base of the anal: a third over the free portion of the caudal.

This fish is said to use *Actiniæ* as a hiding place (De Cresp. Proc. Zool. Soc. 1869, p. 248).

The specimen figured (life-size) is from the Malay Archipelago, and for it I am indebted to Professor Schlegel and Dr. Hubrecht of Leyden.

Habitat.—Seas of India to the Malay Archipelago and beyond.

Genus, 3—Tetradrachmum, *Cantor.*

Dascyllus,* Cuv.

Branchiostegals five: pseudobranchiæ. Preopercle, and occasionally the preorbital are serrated. Teeth villiform in a narrow band, the outer being somewhat the larger. Dorsal with 12 or 13, anal with 2 spines. Scales large or of moderate size. Lateral-line ceases in a tubular form below the soft dorsal, but is continued along the central row of scales as a circular hole in each. Air-vessel large. Pyloric appendages two or three.

* Preoccupied by Latreille (1796), *Coleoptera*.

SYNOPSIS OF SPECIES.

1. *Tetradrachmum marginatum*, D. $\frac{12}{14-16}$, A. $\frac{2}{12-13}$, L. l. 25-26, L. tr. 3/12. Bluish, with a dark zone from the front dorsal spines to the ventral fin: scales on head and body with a blue spot. Red Sea, East coast of Africa, seas of India to the Malay Archipelago and beyond.

2. *Tetradrachmum aruanum*, D. $\frac{12}{12}$, A. $\frac{2}{12}$, L. l. 25-27, L. tr. 3/11. White, with three vertical black bands. Red Sea, East coast of Africa, seas of India to Polynesia.

1. **Tetradrachmum marginatum**, Plate LXXIX, fig. 7.

Pomacentrus marginatus, Rüpp. Atl. Fische, p. 38, t. viii, f. 2.

Dascyllus marginatus, Cuv. and Val. v, p. 439, pl. 133, f. 2; Lefebvre, Voy. Abyss. vi, p. 231; Guér-Ménev. Iconog. iii, pl. xix, f. 6; Steind. Verh. zool-bot, Ges. Wien, 1861, p. 77; Günther, Catal. iv, p. 14; Klunz. Fische Roth. Meer. Verh. z. b. Ges. Wien, 1871, p. 520.

Dascyllus xanthozona, Bleeker, Banda, i, p. 247; Günther, Catal. iv, p. 14.

Pomacentre gros yeux, Liénard, Dix. Rapp. Soc. Hist. Nat. Maur. p. 34.

Tetradrachmum xanthozona, Bleeker, Fish. Madagascar, p. 85.

B. v, D. $\frac{12}{14-16}$, P. 17, V. 1/5, A. $\frac{2}{12-13}$, C. 17, L. l. 25-26, L. tr. 3/12.

Length of head $3\frac{1}{2}$ to 4, of caudal $3\frac{3}{4}$ to 4, height of body $1\frac{3}{4}$ in the total length. *Eyes*—diameter $2\frac{1}{4}$ in length of head, 1/2 to 3/4 of a diameter from end of snout, and 1 apart. Body strongly compressed: the profile, omitting the caudal, is nearly orbicular. Preorbital narrow, the suborbital ring and hind edge of preopercle serrated. *Fins*—dorsal spines from the second to the last of about equal length: caudal slightly emarginate. *Colours*—Bluish. A dark band passes from in front of and below the first two dorsal spines, through the base of the pectoral to the ventral. Snout dark. Every scale on the head with bright blue spot edged with black, also those on the chest and lower two-thirds of the body: a few on the upper third of the body likewise similarly spotted. Soft dorsal and caudal yellow: spinous dorsal, ventral, and anal black.

A small specimen of this species was dredged off the Andamans by Mr. Wood-Mason. The one figured was given me for that purpose by Dr. Bleeker.

Habitat.—Red Sea, east coast of Africa, Andamans, to the Malay Archipelago, China, and beyond.

2. **Tetradrachmum aruanum**, Plate LXXX, fig. 6.

Chætodon arcuatus, Linn. Mus. Ad. Fried. t. xxxiii, fig. 8, and Syst. Nat. p. 1243; Shaw, Zool. iv, pp. 341 and 348.

Chætodon aruanus, Bloch. iii, p. 62, t. cxcviii, f. 2; Bl. Schn. p. 220; Shaw, Zool. iv, p. 348.

Chætodon abu dafur, Forsk. p. 16.

Lutjanus aruanus, Lacép. iv, p. 720.

Pomacentrus aruanus, Rüpp. Atl. Fische, p. 39.

Chætodon araneus, Bennett, Fish. Ceylon, p. 17, pl. xvii.

Dascyllus aruanus, Cuv. and Val. v, p. 434; Bennett, Life of Raffles, p. 688; Rüpp. N. W. Fische, p. 129; Bleeker, Banda, i, p. 246, iii, p. 108; Güuther, Catal. iv, p. 12; Kner, Novara Fische, p. 241: Klunz. Fische Roth. Meer. Verh. z. b. Ges. Wien, 1871, p. 519.

Tetradrachmum arcuatum, Cantor, Catal. p. 241; Bleeker, Bintang. 1868, p. 4.

B. v, D. $\frac{12-13}{12-11}$, P. 17, V. 1/5, A. $\frac{2}{11-12}$, C. 15, L. l. 25-27, L. tr. 3/10-11, Cæc. pyl. 3, Vert. 12/14.

Length of head 4, of pectoral 4, of caudal $4\frac{1}{2}$ to 5, height of body $2\frac{1}{4}$ in the total length. *Eyes*—diameter 2/5 of length of head, 1/2 a diameter from end of snout, and 1 apart. The maxilla reaches to below the anterior fourth of the orbit. Preorbital, pre- and sub- opercles serrated. Shoulder-bone also serrated. *Fins*—third dorsal spine the longest, as is also the second of the anal. *Colours*—pearl-white, with three vertical black bands, the anterior descending from the three first dorsal spines through the eye over the snout to the under surface of the lower jaw: the second from the sixth to the ninth dorsal spines to the ventral fins, which are black: the third from the base of the soft dorsal to the anal: caudal dark, light posteriorly.

Habitat.—Eastern coast of Africa through the seas of India to Polynesia, &c.: it is numerous at the Andamans, Nicobars and Burmah, but much rarer in Western than in Eastern India.

Genus, 4—POMACENTRUS, *(Lacép.) Cuv.*

Pristotis, Rüpp.: *Lepidozygus*, Günther.

Branchiostegals four or five: pseudobranchiæ. Preopercle and usually infraorbital ring serrated. Teeth small, compressed: the crowns smooth or emarginated. Dorsal with 12 *or* 13, *anal with* 2 *spines. Scales rather large. Lateral-line ceases below the soft dorsal fin. Air-vessel present. Pyloric appendages few.*

Geegraphical distribution.—Tropical seas of both hemispheres.

SYNOPSIS OF SPECIES.

1. *Pomacentrus trilineatus*, D. $\frac{13}{15}$, A. $\frac{2}{16}$. L. l. 28, L. tr. 3/9. One or two blue spots on each scale. Three to five blue vertical lines on the forehead. A dark spot on opercles, another across free portion of the tail, a third on the first third of the soft dorsal in the young. Red Sea to the Malay Archipelago and beyond.

2. *Pomacentrus trimaculatus*, D. $\frac{13}{14-15}$, A. $\frac{2}{13-15}$, L. l. 27-28, L. tr. 4/9. Greenish yellow, with the scales on the head spotted with bluish: three black blotches on the back, descending on to the sides. Two blue lines between the eyes, and a light band over the nape. Andamans to the Malay Archipelago.

3. *Pomacentrus bifasciatus*, D. $\frac{13}{14}$, A. $\frac{2}{13-14}$, L. l. 28, L. tr. 3/9. Yellowish, with two black bands descending from the back to the sides. Andamans and Malay Archipelago.

4. *Pomacentrus Bankanensis*, D. $\frac{13}{14}$, A. $\frac{2}{14-15}$, L. l. 26-28, L. tr. 3/9. Two blue lines along forehead, two more through the eye. Scales on body with blue spots. A black white-edged spot from second to sixth dorsal rays, and usually another across the free portion of the tail. Andamans to the Malay Archipelago.

5. *Pomacentrus littoralus*, D. $\frac{13}{14}$, A. $\frac{2}{14}$, L. l. 27, L. tr. $3\frac{1}{2}$/9. Olive, with blue spots on the scales. A black spot at commencement of the lateral-line, another at base of pectoral fin, and a third across the free portion of the tail. Andamans to Australia.

6. *Pomacentrus Jerdoni*, D. $\frac{13}{13}$; A. $\frac{2}{14}$, L. l. 34, L. tr. 5/11. Olivaceous, blue spots on gill-covers and also on scales of sides. A black spot at base of pectoral. Madras.

7. *Pomacentrus albofasciatus*, D. $\frac{12-13}{15}$, A. $\frac{2}{13-14}$, L. l. 26, L. tr. 3/9. Olive, bluish spots on head, a broad vertical yellowish band below last dorsal spines, a round black spot edged with white at base of pectoral. Andamans to the Malay Archipelago.

8. *Pomacentrus punctatus*, D. $\frac{12-13}{15-14}$, A. $\frac{2}{13-14}$, L. l. 27, L. tr. $3\frac{1}{2}$/10. Bluish dots on head and body: a black spot edged anteriorly with white across the base of the last six dorsal rays. Red Sea to the Malay Archipelago.

9. *Pomacentrus labiatus*, D. $\frac{13}{12-13}$, A. $\frac{2}{15-14}$, L. l. 28, L. tr. $3\frac{1}{2}$/$10\frac{1}{2}$. Lips very thick. Brownish, with dark fins. Blue spots on some of the scales of the head and body. Andamans and Nicobars.

1. Pomacentrus trilineatus.

(Ehrenb.) Cuv. and Val v, p. 428; Günther, Catal. iv, p. 25; Klunz. Fische Roth. Meer. Verh. z. b. Ges. Wien, 1871, p. 522.

Pomacentrus biocellatus, Rüpp. N. W. Fische, p. 127, t. xxxi, f. 3 *(young)*.

B. v, D. $\frac{13}{15}$, P. 17, V. 1/5, A. $\frac{2}{16}$, C. 17, L. l. 28, L, tr. 3/9.

Length of head from 4 to $4\frac{1}{4}$, of caudal $5\frac{1}{3}$, height of body $2\frac{3}{4}$ in the total length. *Eyes*—diameter $2\frac{3}{4}$ in length of head, 3/4 of a diameter from end of snout, and 1 apart. The greatest depth of the preorbital equals half a diameter of the eye. Suborbital ring of bones below the eye serrated, and two strong denticulations on the first bone. Two opercular spines. *Colours*—olivaceous: caudal yellow: each scale with one or two blue spots: three to five blue lines on the forehead, the outer of which are continued on to the nape, and sometimes along the base of the dorsal fin. A dark round spot on the opercle: a black spot margined with blue across the free portion of the tail. The immature have a similar spot on the anterior third of the soft dorsal.

Habitat.—Red Sea, East coast of Africa, Andamans, Nicobars, to the Malay Archipelago and beyond.

2. Pomacentrus trimaculatus, Plate LXXX, fig. 10.

Cuv. and Val. v, p. 441; Schlegel, Overz. Amph. in Verh. Nat. Ges. Ned. Ind. Overz. Bezitt, p. 20, t. iv, f. 4; Bleeker, Batav, p. 481; Günther, Catal. iv, p. 19 (not Rüppell, Atl. Fische, p. 39, t. viii, f. 3).

B. v, D. $\frac{13}{14-15}$, P. 17, V. 1/5, A. $\frac{2}{13-15}$, C. 17, L. l. 27-28, L. tr. 4/9.

Length of head $4\frac{1}{2}$ to $4\frac{2}{3}$, of caudal $4\frac{1}{2}$ to $4\frac{2}{3}$, height of body 3 to $3\frac{1}{4}$ in the total length. *Eyes*—diameter 3 to $3\frac{1}{4}$ in length of head, 1 diameter from end of snout, and also apart. Preorbital entire, the suborbital ring of bones below the eye serrated, as is also the vertical edge of the preopercle. Greatest depth of the preorbital equals rather above 1/2 the diameter of the eye. *Fins*—the posterior dorsal spines are slightly longer than the middle ones: caudal emarginate. *Scales*—a row of small ones along the bases of dorsal and anal fins. *Colours*—greenish-yellow, with three black blotches over the back, the first passing over the head from the origin of the dorsal fin to the snout: the second from between the seventh and tenth dorsal spines descends to below the lateral-line: the third from the middle of the soft dorsal also to below the lateral-line. A light band passes over the nape, and two narrow blue bands go from one orbit to the other, these divide the anterior blotch into three portions. A light blue line along the suborbital ring of bones and spots on the scales covering the cheeks, and at the bases of dorsal and anal fins. Dorsal and caudal with a narrow dark edge, anal with a broad dark outer margin, having one or two narrow blue lines along its base.

Habitat.—Andamans to the Malay Archipelago and beyond. The specimen figured (life-size) is from the Andamans, where the species is not uncommon.

3. Pomacentrus bifasciatus.

Bleeker, Floris, p. 330; Günther, Catal. iv, p. 18.

B. v, D. $\frac{13}{14}$, P. 17, V. 1/5, A. $\frac{2}{13-14}$, C. 17, L. l. (25) 28, L. tr. 3/9.

Length of head 4, of caudal 4, height of body $2\frac{2}{3}$ in the total length. *Eyes*—diameter $2\frac{2}{3}$ in length of head, 2/3 of a diameter from end of snout, and 1 apart. Preorbital and suborbital ring of bones entire, vertical limb of preopercle serrated. Greatest depth of preorbital is not equal to 1/2 a diameter of the eye. *Colours*—yellow, with a curved blue line on the preorbital: a black band from the nape over the opercles, and a second from the last dorsal spines, descending from the fin and going to below the lateral-line. Fins yellow, except a black mark on the dorsal being the commencement of the second band.

I captured a single specimen 1·8 inches in length at the Andamans.

Habitat.—Andamans and Malay Archipelago.

4. Pomacentrus Bankanensis.

Bleeker, Sumatra, iii, p. 513; Günther, Catal. iv, p. 26.

Pomacentrus tæniops, Bleeker, Banka, ii, p. 729 (not Cuv. and Val.).

B. v, D. $\frac{13}{14}$, P. 16, V. 1/5, A. $\frac{2}{14-15}$, C. 17, L. l. 26-28, L. tr. 3/9.

Length of head $3\frac{1}{2}$, of caudal $4\frac{1}{2}$, height of body $2\frac{1}{3}$ to $2\frac{3}{4}$ in the total length. *Eyes*—diameter $2\frac{3}{4}$ in length of head, 1/2 to 3/4 of a diameter from end of snout, and 2/3 to 1 diameter apart. Preorbital narrow, entire: suborbital ring serrated in the adult, entire in the immature: posterior limb of preopercle serrated. *Fins*—the dorsal spines increase in length posteriorly: caudal slightly emarginate. *Colours*—brownish, two narrow blue lines along the forehead anteriorly converging on the snout and posteriorly extended on to the back: two more through the eye to the maxilla. A dark blue mark on the opercle: and a line of blue spots along the cheeks below the suborbital ring of bones: each scale with a blue spot, and a black white-edged ocellus at the base of the second to the sixth dorsal rays, and sometimes another across the back of the free portion of the tail behind the base of the dorsal fin. Ventral nearly black.

P. tripunctatus, Cuv. and Val. v, p. 421, a species of which I have not seen the type, appears closely allied to, if not identical with, the above.

Habitat.—Andamans and Nicobars to the Malay Archipelago and beyond.

5. Pomacentrus littoralus.

(Kuhl. and v. Hass.) Cuv. and Val. v, p. 425; Schlegel, Overz. Amph. &c. in Verh. Nat. Gen. Ned. Overz. Bezitt. p. 20, t. iv, f. 3; Bleeker, Batav. p. 483; Günther, Catal. iv, p. 32.

Pomacentrus pristiger, Cuv. and Val. ix, p. 506.

Pomacentrus hogolenensis, Hombr. and Jacq. Voy. Pôle Sud, Poiss. p. 47, pl. v, f. 3.

Pomacentrus katunko, Bleeker, Timor. p. 169.

B. v, D. $\frac{13}{14}$, P. 18, V. 1/5, A. $\frac{2}{14}$, C. 15, L. l. 27, L. tr. $3\frac{1}{2}$/9.

Length of head $4\frac{1}{4}$, of caudal $4\frac{1}{4}$, height of body $2\frac{3}{4}$ in the total length. *Eyes*—diameter $3\frac{1}{2}$ in length of head, 1 diameter from end of snout, and also apart. Greatest depth of preorbital equals 1/2 the diameter of the eye. Suborbital ring of bones serrated, the anterior denticulation being the strongest: preopercle serrated along its vertical limb. *Fins*—dorsal spines increase in length posteriorly: caudal with rounded lobes. *Colours*—olive, with vertical or round bluish spots on the scales. A black spot at the commencement of the lateral-line, another at the base of the pectoral fin, and a third over a free portion of the tail behind the end of the dorsal fin.

Habitat.—Andamans to the Malay Archipelago and Australia.

6. Pomacentrus Jerdoni, Plate LXXX, fig. 7.

Day, Proc. Z. S. 1873, p. 237.

B. iv, D. $\frac{13}{13}$, P. 17, V. 1/5, A. $\frac{2}{14}$, C. 17, L. l. 34, L. tr. 5/11.

Length of head 5, of caudal 4 to $4\frac{1}{4}$, height of body $3\frac{3}{4}$ in the total length. *Eyes*—diameter 1/3 of length of head, 3/4 of a diameter from end of snout, and 1 apart. Preorbital entire, much longer than deep. Preopercle finely serrated on its vertical margin, more coarsely at its angle: opercle with two spines: angle of opercle slightly serrated as well as the contiguous portions of the subopercle: the infraorbital ring narrow, entire, and scaleless. *Teeth*—compressed into a single row of about thirty. *Fins*—dorsal spines increase in length posteriorly: soft dorsal and anal pointed: caudal lobes, especially the upper, produced: second anal spine longest and strongest: the ventral reaches the anal: pectoral rounded, as long as the head without the snout. *Lateral-line*—its tubular portion ceasing below the end of the soft dorsal. *Colours*—olive, becoming light below: seven rows of light blue spots running across the gill cover, one row along the suborbitals, and one over the snout. A row of light lines along the centre of the scales on the sides. A black spot at the base of the pectoral. Fins dark coloured. Base of caudal and the anal barred with light lines.

The pseudobranchiæ are well developed. This is probably the species mentioned but not named by Dr. Jerdon (M. J. L. and Sc. 1851, p. 133), and which he obtained at Madras.

This fish is very closely allied to *P. tapeinosoma*, Bleeker, or *Lepidozygus tapeinosoma*, Günther.

Habitat.—Madras, to 5 inches in length.

7. Pomacentrus albofasciatus, Plate LXXX, fig. 9.

Schlegel, Overz. Amph. &c. in Verh. Nat. Gen. Ned. Overz. Bezitt. p. 21; Günther, Catal. iv, p. 19.

Pomacentrus leucopleura, Bleeker, Sumatra, iv, p. 85.

B. v, D. $\frac{12-13}{15}$, P. 17, V. 1/5, A. $\frac{2}{13-14}$, C. 17, L. l. 26, L. tr. 3/9.

Length of head $4\frac{1}{2}$, of caudal $4\frac{2}{3}$, height of body $3\frac{1}{4}$ in the total length. *Eyes*—diameter $3\frac{1}{3}$ in length of head, 1 diameter from end of snout, and $1\frac{1}{3}$ apart. Preorbital entire, suborbital ring of bones below the eye serrated, as is also the hind edge of preopercle. The greatest depth of the preorbital nearly equals the diameter of the eye. *Colours*—dark olive, with bluish spots on the cheeks: a curved blue line below the eye, and a broad vertical yellowish band underneath the last dorsal spines: sometimes a black spot on the base of the last few dorsal rays, and a round one edged white at the base of the pectoral.

Habitat.—Andamans to the Malay Archipelago. The specimen figured (life-size) was brought from the Nicobars by the late Dr. Stoliczka.

8. Pomacentrus punctatus, Plate LXXX, fig. 8.

Quoy and Gaim. Voy. Uranie. Zool. p. 395, pl. 64, f. 1; Rüpp. Atl. Fische, p. 37; Cuv. and Val. v, p. 429; Bleeker, En. Spec. p. 87; Günther, Catal. iv, p. 29; Klunz. Fische, Roth. Meer. Verh. z. b. Ges. Wien, 1871, p. 522.

Pomacentrus cyanospilus, Bleeker, Ceram, ii, p. 709; Günther, Catal. iv, p. 30; Kner, Novara Fische, p. 242.

Pomacentrus prosopotœnioides, Bleeker, Amb. and Ceram. p. 286.

B. v, D. $\frac{12-13}{15-14}$, P. 16, V. 1/5, A. $\frac{2}{13-14}$, C. 15, L. l. 27, L. tr. $3\frac{1}{2}$/10, Cæc. pyl. 3.

Length of head $3\frac{1}{4}$ to $3\frac{2}{3}$, of caudal $4\frac{1}{3}$, height of body $2\frac{2}{3}$ in the total length. *Eyes*—diameter from 3 to $3\frac{1}{3}$ in the length of head, 1 diameter from end of snout, and also apart. Preorbital in the adult nearly as deep as long, and equal to the diameter of the eye: in the immature its depth is not nearly as great. The hind edge of the preorbital, the suborbital ring, and the posterior margin of the preopercle serrated. The maxilla reaches to below the hind nostril. *Fins*—dorsal spines moderately strong, subequal in height but lower than the soft dorsal which is pointed. Caudal emarginate. *Lateral-line*—the tubes cease below the last dorsal spine. *Colours*—grayish-brown, head with irregular bluish-white dots and one on each scale of the body. A black spot, margined anteriorly and superiorly with white, exists across the base of the last six dorsal rays, and is usually also continued on to the back of the free portion of the tail behind the base of the dorsal fin. Occasionally a dark spot in the axil of the pectoral fin.

In Forster's Desc. Anim. (Lichtenstein Ed.) p. 227, *Chætodon lividus*, Forst. and Bl. Schn. is said to be identical with *Pomacentrus punctatus*.

Habitat.—Red Sea, Mauritius to the Andamans, Nicobars and Malay Archipelago. The specimen figured (life-size) is from the Andamans.

9. Pomacentrus labiatus, Plate LXXXI, fig. 2.

B. v, D. $\frac{13}{12-13}$, P. 17, V. 1/5, A. $\frac{2}{13-14}$, C. 17, L. l. 28, L. tr. $3\frac{1}{2}/10\frac{1}{2}$.

Length of head $3\frac{3}{4}$, of caudal 5, height of body $2\frac{1}{2}$ in the total length. *Eyes*—diameter 3 to $3\frac{1}{4}$ in length of head, 1 diameter from end of snout, and also apart. Suborbital ring of bones rough, scarcely serrated,* preopercle very finely serrated or even entire: preorbital scaleless, its greatest depth equal to half the diameter of the eye. Maxilla reaches to nearly below the front edge of the eye. Lips very large, thick, covered with papillæ, and reflected all round the mouth. *Teeth*—minute, compressed. *Fins*—dorsal spines of moderate strength, of about equal height, not equalling the soft dorsal which is pointed. Ventral reaches the anal. Upper lobe of caudal usually slightly the longer. *Lateral-line*—the tubular portion ceases under the commencement of the soft dorsal fin. *Colours*—brown, lightest on the chest and lower surface of the head: fins black. Blue spots on some of the scales of the head, and usually one on the centre of each scale in the row above the lateral-line.

This species is distinguished from any others recorded from India by its enormously developed lips.

Habitat.—Andamans and Nicobars, to $3\frac{1}{2}$ inches in length.

Genus, 5—Glyphidodon, *(Lacépède)*, *Cuvier.*

Euschistodus, *Dischistodus*, *Hypsipops*, *Pomatoprion*, *Microspathodon*, Gill.

Branchiostegals five or six: pseudobranchiæ. Body short, compressed. Cleft of mouth small. Opercles entire. Teeth compressed and in a single row, sometimes the alternate ones being similar. A single dorsal fin with the spines rather more or less, or equal in number to the rays: anal with two spines. Scales of moderate size. The tubular portion of the lateral-line ceases below the end of the dorsal fin, but is continued in the form of minute circular orifices. Air-vessel present. Pyloric appendages few.

* This fish in some specimens (always perhaps in the young) has no serrations in the bones of the head, in others the suborbital ring is roughened and the preopercle is finely serrated.

SYNOPSIS OF SPECIES.

1. *Glyphidodon sordidus*, D. $\frac{13}{14-16}$, A. $\frac{2}{12-15}$, L. l. 29, L. tr. 4/12. Preorbital deep. Middle dorsal spines the longest. Five dull bands on the sides, a sixth over the tail. Red Sea to China.

2. *Glyphidodon leucopleura*, D. $\frac{13}{15}$, A. $\frac{2}{14}$, L. l. 28, L. tr. 4/14. Preorbital deep. Middle dorsal spines the longest. Vertical bands: a deep black blotch over free portion of the tail. Andamans.

3. *Glyphidodon Cochinensis*, D. $\frac{13}{12-15}$, A. $\frac{2}{10-11}$, L. l. 28, L. tr. 3/8. All the vertical fins produced. Deep black. Seas of India to the Andamans.

4. *Glyphidodon notatus*, D. $\frac{13}{13-14}$, A. $\frac{2}{13-14}$, L. l. 28-30, L. tr. $4\frac{1}{2}$/12. Five narrow white vertical bands. Andamans.

5. *Glyphidodon septemfasciatus*, D. $\frac{13}{13}$, A. $\frac{2}{12}$, L. l. 29, L. tr. 3/11. Preorbital deep. Height of body $2\frac{2}{3}$ in the total length. Seven vertical bands. Seas of India to China.

6. *Glyphidodon cœlestinus*, D. $\frac{13}{13}$, A. $\frac{2}{12-13}$, L. l. 29, L. tr. $4\frac{1}{2}$/12. Preorbital of moderate depth. Height of body $2\frac{2}{3}$ in the total length. Five vertical black bands. Red Sea to Polynesia.

7. *Glyphidodon Bengalensis*, D. $\frac{13}{12-13}$, A. $\frac{2}{11-12}$, L. l. 29-30, L. tr. 4/11. Preorbital deep. Height of body $2\frac{1}{2}$ in the total length. Seven vertical bands. Seas of India to the Malay Archipelago and beyond.

8. *Glyphidodon antjerius*, D. $\frac{13}{12-13}$, A. $\frac{2}{12-13}$, L. l. 26-28, L. tr. $2\frac{1}{2}$/9. Colours various. One or two black spots on dorsal fin, usually a blue band along upper portion of body. Red Sea to Malay Archipelago and beyond.

9. *Glyphidodon leucogaster*, D. $\frac{13}{12-13}$, A. $\frac{2}{12-13}$, L. l 26-28, L. tr. 3/12. Upper edge of dorsal and outer two-thirds of anal black, the rest yellow. A black spot at base of pectoral. Red Sea to the Malay Archipelago.

10. *Glyphidodon modestus*, D. $\frac{13}{12}$, A. $\frac{2}{12}$, L. l. 23-24, L. tr. $2\frac{1}{2}$/8. Yellowish-olive, vertical fins stained gray externally. Andamans to China.

11. *Glyphidodon Sindensis*, D. $\frac{13}{11-12}$, A. $\frac{2}{11-13}$, L. l. 26, L. tr. $3\frac{1}{2}$/10. Violet, each scale with a blue spot. Soft dorsal, anal, and caudal yellow. Kurrachee in Sind.

1. Glyphidodon sordidus, Plate LXXXIII, fig. 1.

Chætodon sordidus, Forsk. p. 62, No. 87; Bl. Schn. p. 230.
Pomacanthus sordidus, Lacép. iv, p. 519.
Chætodon calamoia pota, Russell, Fish. Vizag. i, p. 67, pl. 85.
Glyphisodon sordidus, Rüpp. Atl. Fische, p. 34, t. viii, f. 1; Cuv. and Val. v, p. 466; Bleeker, Beng. en Hind. p. 52, Labr. Cten. p. 16; Jerdon, M. J. L. and Sc. 1851, p. 133; Günther, Catal. iv, p. 42; Kner, Novara Fische, p. 245; Klunz. Fische R. M. Verh. z. b. Ges. Wien, 1871, p. 525.
Glyphisodon gigas, Liénard. Dix. Rapp. Soc. Hist. Nat. Maur. p. 35.
Glyphidodon Adenensis, Günther, Fish. Zanz. p. 83, pl. xi, f. 1.
Chak-mud-dah, Andam.: *Calamoia pota*, Tel.

B. v, D. $\frac{13}{14-16}$, P. 17, V. 1/5, A. $\frac{2}{12-15}$, C. 15, L. l. 29, L. tr. 4/12, Cæc. pyl. 3, Vert. 12/14.

Length of head 4 to $4\frac{1}{4}$, of caudal $4\frac{2}{3}$, height of body $2\frac{1}{4}$ in the total length. *Eyes*—diameter 4 in length of head, $1\frac{1}{4}$ diameters from end of snout, and $1\frac{1}{3}$ apart. Greatest width of the preorbital, which has an unnotched edge, nearly equals the diameter of the eye, whilst the suborbitals are about half as wide. The profile from the snout to the first dorsal fin ascends abruptly. *Teeth*—about 36 in the upper jaw, their crowns are notched. *Fins*—the fifth to the seventh dorsal spines the longest: soft dorsal higher than long: caudal forked. *Colours*—yellowish-olive, the fins being of a darker colour. Five dull bands, broader than the ground colour, descend from the dorsal fin to the sides, and a sixth, which is nearly black, goes over the free portion of the tail. A black spot at the base of the pectoral. A row of black spots across the nape.

Habitat.—Red Sea, East coast of Africa, seas of India to China. The specimen figured (life-size) was taken in Sind.

2. Glyphidodon leucopleura, Plate LXXXIII, fig. 4.

B. v, D. $\frac{13}{15}$, P. 17, V. 1/5, A. $\frac{2}{14}$, C. 15, L. l. 28, L. tr. 4/14.

Length of head $3\frac{1}{2}$, of caudal $4\frac{1}{3}$, height of body $2\frac{2}{3}$ in the total length. *Eyes*—diameter $2\frac{1}{2}$ in length of head, 1/2 a diameter from end of snout, and 3/4 of a diameter apart. The greatest depth of the preorbital equals 1/3 of the diameter of the orbit, the suborbital ring of bones is very narrow. *Teeth*—in a single row, small, compressed, and with notched summits. *Fins*—the third to the sixth dorsal spines considerably longer than the last: soft dorsal angular. Caudal slightly lobed, lobes pointed. *Scales*—superiorly extend forwards to nearly as far as the front edge of the eye, none on the spinous portion of the dorsal fin. *Colours*—brownish, with a dark, almost black, band from the first half of the dorsal fin descending to the ventral: several narrow white vertical bands from the back to the abdomen. A black spot, edged with white, on the free portion of the tail just behind the end of the dorsal fin and extending upwards on to the bases of the last three dorsal rays. Ventral and anal black. Caudal yellowish, with dark outer edges.

Habitat.—Two specimens, of about the same length, (figured life-size) from the Andamans.

3. Glyphidodon Cochinensis, Plate LXXXI, fig. 1.

Day, Proc. Zool. Soc. 1865, p. 38, and Fish. Malabar, p. 156, pl. xii.

B. v, D. $\frac{13}{12-15}$, P. 15, V. 1/5, A. $\frac{2}{10-11}$, C. 15, L. l. 28, L. tr. 3/8.

Length of head from $5\frac{1}{2}$ to 6, of caudal $2\frac{1}{2}$ to 3, height of body $3\frac{2}{3}$ in the total length. *Eyes*—diameter 3 to $3\frac{1}{4}$ in length of head, 3/4 of a diameter from end of snout, and 1 apart. Preorbital narrow, about 1/3 width of orbit, suborbital ring of bones of nearly equal width. *Teeth*—about 40 in the upper jaw, in a single compressed row, all have their summits notched. *Fins*—soft portions of dorsal, anal, and caudal lobes much elongated, dorsal spines moderately strong, sub-equal in length from the third. *Colours*—purplish-black, rather lighter on the abdomen, edges of scales sometimes with a lighter tinge: pectoral not so dark as other fins.

Habitat.—Cochin and the Andamans. The one figured (life-size) is from the Andamans.

4. Glyphidodon notatus, Plate LXXXIII, fig. 5.

Day, Proc. Zool. Soc. 1869, p. 521.

B. v, D. $\frac{13}{13-14}$, P. 19, V. 1/5, A. $\frac{2}{13-14}$, C. 17, L. l. 28-30, L. tr. $4\frac{1}{2}$/12.

Length of head 4 to $4\frac{1}{4}$, of caudal 4 to $4\frac{1}{4}$, height of body $2\frac{1}{3}$ in the total length. *Eyes*—diameter 3 in the length of the head, 3/4 of a diameter from end of snout, and 1 apart. Greatest depth of the preorbital equals 1/2 the diameter of the eye, the suborbital ring is unnotched and posteriorly decreases rapidly in width. Greatest width of the head equals half its height. *Teeth*—narrow, compressed. *Fins*—third to sixth dorsal spines the longest in the fin, rays much longer than the spines: caudal deeply forked. *Scales*—extend forwards on the summit of the head to opposite the front edge of the eyes. *Colours*—olive brown, lightest inferiorly, five narrow white bands pass from the back down the sides, the first from the first dorsal spine to the base of the pectoral fin: the second from the third spine to the middle of the ventral: the third from the seventh spine to the commencement of the anal: the fourth from the tenth to the middle of the anal: and the fifth over the free portion of the tail. A black spot at the base of the pectoral: caudal yellowish.

Habitat.—Andamans, to $3\frac{1}{2}$ inches in length.

5. Glyphidodon septemfasciatus, Plate LXXXI, fig. 7.

Cuv. and Val. v, p. 463; Bleeker, Sumatra, i, p. 582; Günther, Catal. iv, p. 40.

B. v, D. $\frac{13}{13}$, P. 17, V. 1/5, A. $\frac{2}{12}$, C. 17, L. l. 29, L. tr. 3/11.

Length of head $4\frac{1}{4}$, of caudal 5, height of body $2\frac{2}{3}$ in the total length. *Eyes*—diameter $3\frac{1}{2}$ in length of head, $1\frac{1}{4}$ diameters from end of snout, and $1\frac{2}{3}$ apart. The greatest depth of the preorbital, which is not notched, equals 3/4 of the diameter of the eye: whilst that of the suborbitals (below the eye) equals 2/3. *Fins*—dorsal spines of moderate strength, the fourth to the sixth being the longest. Soft dorsal angular, the fifth ray being the longest: caudal lobes broad, not very greatly emarginate. *Scales*—on the head reach to opposite the middle of the eye. *Colours*—greenish-olive, with seven dark cross bands wider than the ground colour: the first, which is indistinct, from the summit of the head to the preopercle: the second from in front of the dorsal fin to the base of the pectoral: the third, fourth, and fifth from the spinous dorsal: the sixth from below the soft dorsal, and the seventh over the free portion of the tail. Spinous dorsal with a black edge and a yellowish band below it. A black spot at base of pectoral.

Habitat.—Seas of India to China. The specimen figured (life-size) is from Bombay.

6. Glyphidodon cælestinus, Plate LXXXIII, fig. 2.

Chætodon saxatilis, Forsk. p. 62; Bl. t. ccvi, f. 2 (not Linn.).

Labrus sexfasciatus, Lacép. iii, p. 477, pl. xix, f. 2.

Chætodon rahti potah, Russell, Fish. Vizag. i, p. 67, pl. 86.

Chætodon Tyrwhitti, Benn. Fish. Ceylon, p. 25, pl. 25.

Glyphisodon saxatilis, Rüpp. Atl. Fische, p. 35, and N. W. Fische, p. 126; Klunz. Fische, R. M. Verh. z. b. Ges. Wien, 1871, p. 524.

Glyphisodon rahti, Cuv. and Val. v, p. 456, ix, p. 507; Cantor, Mal. Fish. p. 242; Schleg. Overz. Amph. &c. in Verh. Ned. Overz. Bezitt, p. 22; Bleeker, Beng. en Hind. p. 52, and Amb. and Ceram. p. 287; Jerdon, Madr. J. L. and Sc. 1851. p. 133; Blyth, Pro. Asi. Soc. Bengal, 1860, p. 111; Richards. Ich. China, p. 253.

Glyphisodon cælestinus (Soland.) Cuv. and Val. v, p. 464, pl. 135, and ix, p. 508; Swainson, Fishes, ii, p. 216; Richards. l. c.; Bleeker. Beng. en Hind. p. 52, and Labr. Cten. p. 15; Guér.-Ménev. Iconog. iii, pl. xix, f. 8; Günther, Catal. iv, p. 38; Kner, Novara Fische, p. 244.

Glyphisodon Tyrwhitti, Richards. l. c.

Glyphisodon quadrifasciatus, et *Waigiensis*, Bleeker, Labr. Cten. p. 17, and Batav. p. 484.

Apogon quinquevittatus, Blyth, Proc. Asi. Soc. Bengal, 1858, p. 272.

Sparus fasciatus, Gronov. ed. Gray, p. 60.

B. v, D. $\frac{13}{13}$, P. 17, V. 1/5, A. $\frac{2}{12-13}$, C. 17, L. l. 29, L. tr. $4\frac{1}{2}$/12.

Length of head $4\frac{1}{2}$, of caudal $4\frac{1}{4}$, height of body $2\frac{2}{3}$ in the total length. *Eyes*—diameter $3\frac{1}{2}$ to $3\frac{3}{4}$ in length of head, 3/4 of a diameter from end of snout, and 1 apart. The greatest depth of the preorbital equals 2/3 of the diameter of the eye, the suborbital ring very narrow. *Teeth*—about 40 in the upper jaw, narrow and notched. *Fins*—dorsal spines increase in length posteriorly, soft dorsal pointed, its fourth and fifth rays being the longest. Caudal deeply forked. *Scales*—on the head extend forwards to opposite the front edge of the eye. *Colours*—olive-brown, with five vertical dark cross bands that are narrower than the interspaces between them, the first descends from the first spine to the shoulder: the second from the fourth and fifth spines: the third from the tenth and eleventh: the fourth from the last dorsal spines to the front edge of the anal: and the fifth across the free portion of the tail, being continued on to the last dorsal rays. A dark spot at the base of the pectoral fin. Outer edge of caudal usually black.

Habitat.—From the Red Sea and east coast of Africa, through the seas of India to the Malay Archipelago and Polynesia. The one figured (life-size) was from Bombay.

7. Glyphidodon Bengalensis, Plate LXXXIII, fig. 3.

? *Chætodon Bengalensis*, Bl. t. ccxiii, f. 2.
Labrus macrogaster, Lacép. iii, p. 430, 477, pl. xix, f. 3.
Glyphisodon Bengalensis, Cuv. and Val. v, p. 458; Bleeker, Beng. en Hind. p. 52, and Labr. Cten. p. 11.
Glyphidodon Bengalensis, Günther, Catal. iv, p. 41; Kner, Novara Fische, p. 244.
Chák-mud-dah, Andamanese.

B. v, D. $\frac{13}{12-13}$, P. 17, V. 1/5, A. $\frac{2}{11-12}$, C. 15, L. l. 29-30, L. tr. 4/11.

Length of head $4\frac{1}{4}$, of caudal $4\frac{1}{4}$, height of body $2\frac{1}{2}$ in the total length. *Eyes*—diameter $3\frac{1}{6}$ in length of head, 1 diameter from end of snout, and $1\frac{1}{4}$ apart. Profile from snout to base of dorsal fin almost semicircular. Greatest depth of the preorbital equals the diameter of the eye; the suborbital ring, above the angle of the mouth, equals 3/4 of a diameter of the eye. *Teeth*—in a single compressed row, having the crowns notched. *Fins*—the third to the sixth dorsal spines rather longer than the last; soft dorsal angular, the fourth and fifth rays being the longest. Caudal forked, lobes pointed. *Scales*—on the summit of the head reach forwards to opposite the middle of the eyes. *Colours*—of a dull greenish-olive, with seven vertical dark bands extending downwards from the back, the first across the head, the second across the neck, four below the dorsal fin and one across the free portion of the tail. A dark edge to spinous dorsal, a dark spot at base of pectoral, and two bands along anal fin.

Habitat.—Seas of India to the Malay Archipelago and beyond. The one figured (life-size) is from the Andaman islands.

8. Glyphidodon antjerius, Plate LXXXI, figs. 4 and 5.

Chætodon Brownriggii, Bennett, Fish. Ceylon, p. 8, pl. viii.
Glyphisodon antjerius, (Kuhl. and v. Hass.) Cuv. and Val. v, p. 481; Bleeker, Kokos, iv, p. 454; Günther, Catal. iv, p. 50; Kner, Novara Fische, p. 245; Klunz. Verh. z. b. Ges. Wien, 1871, p. 527.
Glyphisodon unimaculatus, Cuv. and Val. v, p. 478; Schleg. Overz. Amph. &c. in Verh. Nat. Gesch. Ned. Overz. Bezitt. p. 23, t. vi, f. 1; Bleeker, Sumatra, ii, p. 284; Günther, Catal. iv, p. 51.
Glyphisodon biocellatus, Cuv. and Val. v, p. 482; Quoy. and Gaim. Voy. Uranie, Zool. p. 389; Schlegel. l. c. p. 24, t. vi, f. 4; Bleeker, Sumatra, ii, p. 286; Less. Voy. Coq. Zool. Poiss, p. 188 (two black spots on dorsal fin).
Glyphisodon zonatus, Cuv. and Val. v, p. 483; Schleg. l. c. p. 24; Peters, Wiegm. Arch. 1855, p. 266.
Glyphisodon punctulatus, Cuv. and Val. v, p. 484 (two dorsal spots, many blue spots, no blue line on forehead).
Glyphisodon Brownriggii, Cuv. and Val. v, p. 484; Bleeker, Beng. en Hind. p. 52; Kner, Novara Fische, p. 245.
Glyphisodon andjerius, Schleg. l. c. p. 24, t. vi, f. 3.
Glyphisodon Rossii, Bleeker, Kokos, p. 48 (most of body markings absent).
Glyphisodon Balinensis, Bleeker, Bali, p. 9.
Glyphidodon fasciatus, Günther, Catal. iv, p. 51 (blue transverse spot on body).

B. v, D. $\frac{13}{12-13}$, P. 17, V. 1/5, A. $\frac{2}{12-13}$, C. 17, L. l. 26-28, L. tr. $2\frac{1}{2}$/9.

Length of head $4\frac{1}{4}$ to $4\frac{1}{2}$, of caudal 5, height of body $2\frac{2}{3}$ to 3 in the total length. *Eyes*—diameter 3 to $3\frac{1}{2}$ in length of head, 3/4 to 1 diameter from the end of snout, and 1 apart. Preorbital rather broad, its greatest depth equal to about 1/2 a diameter of the eye: suborbital ring narrow. *Teeth*—narrow and in two rows. *Fins*—posterior dorsal spines somewhat the longest: soft dorsal and anal angular. Caudal slightly forked. *Scales*—on the summit of the head, are continued forwards to opposite the front edge of the eyes. *Colours*—exceedingly various, the markings being partially or entirely absent in some specimens, and that not merely due to age. Cærulean blue above the lateral-line, this colour extending on to some scales along the base of that fin, and ending at the end of the soft dorsal by surrounding one (sometimes two) black blotches, the black blotches on the dorsal fin are sometimes absent. A blue line is generally continued along the supraorbital region, joining another from the opposite side across the snout. A median blue or dark band occasionally is seen along the occiput. Two blue bands along the eye, and one from the eye to the angle of the mouth: another

along the suborbital ring of bones, and one or two along the cheeks. In some specimens there is a spot of blue on many of the scales of the body.

Habitat.—From the Red Sea through those of India to the Malay Archipelago and beyond. The specimens figured (life-size) are from the Andamans.

9. **Glyphidodon leucogaster**, Plate LXXXI, fig. 3.

Bleeker, Labr. Cten. p. 26; Günther, Catal. iv, p. 46; Klunz. Verh. z. b. Ges. Wien, 1871, p. 523.

B. v, D. $\frac{13}{12-13}$, P. 17, V. 1/5, A. $\frac{2}{12-13}$, C. 17, L. l. 26-28, L. tr. 3/12.

Length of head $4\frac{1}{2}$, of caudal $4\frac{1}{2}$, height of body $2\frac{1}{3}$ in the total length. *Eyes*—diameter $2\frac{3}{4}$ in length of head, 2/3 of a diameter from end of snout, and $1\frac{1}{4}$ apart. Preorbital with a shallow notch, its greatest width equals nearly 1 diameter of the eye: suborbital ring narrow. *Teeth*—narrow, about 46 in the upper jaw. *Fins*—dorsal spines, after the second, subequal in length: soft portion of dorsal rather pointed. Second anal spine as long as the head excluding the snout, the soft portion of the fin rounded. Caudal forked with pointed lobes. *Scales*—extend forward on the top of the head to the snout, they also cover the preorbital and suborbitals. *Colours*—olive-brown, becoming lighter on the sides and yellowish on the abdomen. Upper edge of dorsal and outer two-thirds of anal black, the rest of the fin and the ventral yellow. Outer margin of caudal dark. A black spot at base of pectoral fin.

Habitat.—Red Sea, East coast of Africa, Nicobars to the Malay Archipelago. The one figured (life-size) is from the latter locality, for it I have to thank Professor Schlegel and Dr. Hubrecht of Leyden.

10. **Glyphidodon modestus**, Plate LXXXI, fig. 6.

Schleg. Overz. Amphr. &c. in Verh. Nat. Gesch. Ned. Overz. Bezitt. p. 23, t. vi, f. 2; Bleeker, Sumatra, ii, p. 285; Günther, Catal. iv, p. 55; Kner, Novara Fische, p. 246.

B. v, D. $\frac{13}{12}$, P. 18, V. 1/5, A. $\frac{2}{12}$, C. 15, L. l. 23-24, L. tr. $2\frac{1}{2}$/8.

Length of head $4\frac{1}{2}$, of caudal 5, height of body $3\frac{1}{3}$ in the total length. *Eyes*—diameter $2\frac{3}{4}$ to 3 in length of head, 2/3 to 3/4 of a diameter from end of snout, and 1 apart. The greatest depth of the preorbital is a little more than half the diameter of the eye, posteriorly the suborbital ring of bones rapidly narrows. *Teeth*—compressed, notched at their extremities, and about 36 in the upper jaw. *Fins*—the dorsal spines gradually increase in length to the last, soft dorsal and anal somewhat rounded, caudal slightly cleft and having rounded lobes. *Scales*—extend forward on the top of the head to opposite the front edge of the eye: none on the preorbital or suborbital ring of bones. *Colours*—yellowish-olive, becoming lighter on the sides and beneath: the outer third of dorsal and anal fins grayish: a brownish dot superiorly at the base of the pectoral fin.

Habitat.—Andamans through the seas of India to China. The one figured (life-size) is from the Andamans.

11. **Glyphidodon Sindensis**, Plate LXXXII, fig. 2.

Day, Sea Fishery Report, 1873, Appendix, p. cclxiii.

B. v, D. $\frac{13}{11-12}$, P. 19, V. 1/5, A. $\frac{2}{11-13}$, C. 15, L. l. 26, L. tr. $3\frac{1}{2}$/10.

Length of head $3\frac{3}{4}$ to 4, of caudal $4\frac{1}{4}$ to $4\frac{1}{2}$, height of body $2\frac{2}{3}$ to 3 in the total length. *Eyes*—diameter 3 in length of head, 1/2 a diameter from end of snout, and 1 apart. Preorbital in its widest part not equal to 1/3 of the diameter of the eye, suborbital ring of bones narrow. *Teeth*—in a narrow row, about 50 in the upper jaw, their summits notched. *Fins*—dorsal spines increase to the fourth, all the posterior ones about equal: soft dorsal rather produced in its centre: caudal forked, upper lobe the longer, and may be produced, more especially in the young: pectoral rounded, as long as head without the snout: soft dorsal and anal scaled. *Scales*—on the summit of the head extend forward as far as the snout, also on pre- and sub-orbitals. *Colours*—deep violet, extending on to the dorsal and anal fins: pectoral hyaline with a dark mark at its base: ventral nearly black: the posterior extremities of the dorsal and caudal canary yellow: all the scales on the upper part of the body and free portion of the tail with a light blue central spot. Some blue lines about the head in the young, which has also the free portion of the tail yellow and the chest light coloured.

Habitat.—Numerous in the harbour at Kurrachee in Sind. The one figured (life-size) is from that locality, where I did not obtain them larger.

Genus, 6—Heliastes, *Cuv. and Val.*

Furcaria, Poey.

Branchiostegals five: pseudobranchiæ. All the opercles entire. Teeth in the jaws conical, in a narrow and irregular row. Scales of moderate size. Dorsal fin with 12 to 14 spines: anal with two. Lateral-line in a tubular form not continued beyond the end of the base of the dorsal fin. Air-vessel present. Pyloric appendages two.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Heliastes lepidurus*, D. $\frac{11-12}{10-11}$, A. $\frac{2}{10}$, L. l. 26-27. Olive, scales with a blue dot. East coast of Africa to the Malay Archipelago and beyond.

1. **Heliastes lepidurus**, Plate LXXXII, fig. 1.

Heliases lepidurus, Cuv. and Val. v, p. 498; Bleeker, Ich. Sumb. Journ. Ind. Arch. 1848; Günther, Catal. iv, p. 63.

Glyphisodon Bandanensis, Bleeker, Banda, i, p. 248.

Heliases frenatus, Bleeker, Ceram. p. 710 (not Cuv. and Val.).

Heliases cæruleus, Bleeker, Kokos, iv, p. 455 (not Cuv. and Val.).

Glyphidodon anabatoides, Day, Proc. Zool. Soc. 1870, p. 696.

B. v, D. $\frac{11-12}{10-11}$, P. 15, V. 1/5, A. $\frac{2}{10}$, C. 17, L. l. 26-27, L. tr. $2\frac{1}{2}$/9.

Length of head 4 to $4\frac{1}{4}$, of caudal $4\frac{2}{3}$, height of body $2\frac{3}{4}$ to 3 in the total length. *Eyes*—diameter 3 in length of head, 3/4 to 1/2 of a diameter from end of snout, and 1 apart. Greatest width of preorbital 1/3 of that of the orbit. *Teeth*—in a single row. *Fins*—third to fifth dorsal spines the longest: caudal deeply forked. *Scales*—on preorbital and suborbitals, they extend on the summit of the head to the snont. *Colours*—olive, each scale with a blue dot: a blue line from the eye across the preorbital, a blue spot at the commencement of the lateral-line: dorsal dotted with blue, and having a dark edge: anal dotted with yellow and also with a dark margin: caudal with a brownish longitudinal band along either lobe. A dark axillary spot on the pectoral: ventrals green.

I found this fish very abnndant about the coral reefs of the Andaman islands. As soon as the water was splashed they appeared to retire for safety to the branching coral where no large fish could follow them, and they allowed great pieces to be removed from the water without venturing to leave their retreat.

Habitat.—East coast of Africa, Andamans, Malay Archipelago and beyond.

Family, XLI—LABRIDÆ, *Cuv.*

Labroidei cycloidei, Mull.; *Scaroidei*, Cantor; *Cyclolabridæ*, Owen.

Branchiostegals five or six: pseudobranchiæ. Gills three and a half. Body oblong or elongated. Teeth in the jaws, palate edentulous: lower pharyngeal bones anchylosed along the median line into one without any median suture. A single dorsal fin with usually as many or more spines than rays: the anal rays usually similar to those of the dorsal: ventral thoracic, with one spine and five rays. Scales cycloid. Lateral-line complete or interrupted. Air-vessel present. No cœcal sac to the stomach. Pyloric appendages absent.

These fishes appear to be entirely marine and mostly confined to the seas of tropical and temperate regions. Many of them are adorned with gorgeous colours, being generally abundant in the neighbourhood of rocks and coral reefs. Some are provided with excessively strong teeth to enable them to crush the shells of the marine molluscs, and a few have an additional pointed tooth at the angle of the mouth which is supposed to be employed for pressing a shell against the crushing front and lateral teeth.

SYNOPSIS OF GENERA.

1. *Chœrops*. Cheeks elevated. Anterior teeth conical and free, the lateral ones more or less confluent into a ridge. D. $\frac{13}{20}$. Scales large, small ones on cheeks. Lateral-line continuous. Red Sea, through those of India to Australia.

2. *Cossyphus*. Anterior teeth conical and free: a posterior canine. Dorsal fin with twelve (rarely thirteen) spines. Cheeks and opercles scaly, also base of soft dorsal. Lateral-line continuous. Red Sea, throughout those of India to Australia and beyond.

3. *Labroides*. Anterior teeth forming a pair of curved fangs in either jaw. Dorsal fin with nine spines. Cheeks and opercles scaly. Lateral-line continuous. Red Sea, seas of India to the Malay Archipelago.

4. *Cheilinus*. Anterior teeth conical and free. Dorsal fin with nine or ten spines. Cheeks and opercles scaly. Lateral-line interrupted. Red Sea, East coast of Africa, seas of India to China and beyond.

5. *Epibulus*. Lower jaw produced backwards. Anterior teeth conical and free. Dorsal fin with nine spines. Cheeks and opercles scaly. Lateral-line interrupted. Seas of India to the Malay Archipelago.

6. *Anampses*. Two compressed and cutting anterior teeth in either jaw. Dorsal fin with nine spines. Head scaleless. Lateral-line continuous. Red Sea, seas of India to the Malay Archipelago and beyond.

7. *Hemigymnus*. Anterior teeth free and conical. Dorsal fin with nine spines. Cheeks with a row of a few small scales. Lateral-line continuous. Red Sea, seas of India to the Malay Archipelago and beyond.

8. *Stethojulis*. Anterior teeth conical and free: a posterior canine. Dorsal fin with nine spines. Head scaleless. Scales on chest at least as large as those on the body. Lateral-line continuous. Red Sea, seas of India to the Malay Archipelago and beyond.

9. *Platyglossus*. Anterior teeth conical and neither bent backwards nor outwards: a posterior canine. Dorsal fin with nine spines. Head scaleless. Scales on chest smaller than those on the body. Lateral-line continuous. Red Sea, seas of India to the Malay Archipelago and beyond.

10. *Novacula*. Anterior teeth conical and free: no posterior canine. Dorsal fin with nine spines, the two first of which are sometimes semi-detached from the remainder. Head scaleless or with a few rudimentary scales on the cheeks. Lateral-line interrupted. Seas of India, intertropical seas and beyond.

11. *Julis*. Anterior teeth conical and free: no posterior canine. Dorsal fin with eight spines. Head scaleless. Lateral-line continuous. Red Sea, seas of India, also tropical and adjacent ones.

12. *Gomphosus*. Snout produced. Anterior teeth conical and free: no posterior canine. Dorsal fin with eight spines. Head scaleless. Lateral-line continuous. Red Sea, seas of India to the Malay Archipelago and beyond.

13. *Cheilio*. Body elongated: anterior teeth conical and free: no posterior canine. Dorsal fin with nine spines. Head scaleless, or a few scales on opercle. Lateral-liue continuous. Red Sea, seas of India to the Malay Archipelago and beyond.

14. *Coris*. Anterior teeth conical and free. Dorsal fin with nine spines. Scales small, none on the head. Lateral-line continuous. Red Sea, seas of India to Australia and beyond: also found in the Mediterranean.

15. *Cymolutes*. Anterior teeth conical and free: no posterior canine. Dorsal with nine spines. Scales small, none on head. Lateral-line interrupted. East coast of Africa, seas of India to the Malay Archipelago.

16. *Pseudodax*. Anterior teeth broad and with cutting lateral edges. Dorsal with eleven spines. Scales of moderate size on cheeks and opercles. Lateral-line continuous. Nicobars to the Malay Archipelago and beyond.

17. *Scarichthys.* Teeth in one row anteriorly soldered together, row in mandibles oblique. Dorsal with nine spines. Scales large, a row on cheek. Lateral-line continuous. Red Sea, seas of India to the Malay Archipelago and beyond.

18. *Callyodon.* Teeth anteriorly imbricated. Dorsal fin with nine, anal with two spines. Scales large, a single row on cheeks. Lateral-line strongly bent or interrupted. Red Sea, seas of India.

19. *Pseudoscarus.* Upper jaw slightly projecting beyond the lower. Anterior teeth soldered together in quincuncial order. Dorsal fin with nine, anal with two or three spines. Scales large, two or more rows on the cheeks. Lateral-line continuous. Tropical seas.

Genus, 1—Chærops, *Rüppell.*

Cossyphus, sp. Cuv. and Val.; *Choirodon* and *Cossyphodes*, Bleeker; *Hypsigenys*, Günther.

Branchiostegals five or six: pseudobranchiæ. Body oblong, compressed. Snout obtuse. Preopercle serrated or entire. The four anterior teeth conical and free, whilst the lateral ones are more or less confluent in an osseous ridge, a posterior canine tooth, occasionally two, may be present; inferior pharyngeal teeth not confluent or pavement-like. A single dorsal fin with more spines (thirteen) than rays (seven): anal with three spines and more rays than the soft dorsal (9-10). *Scales large: cheeks high, covered with small scales, which usually are not imbricated: opercles scaled. Vertical fins with scaly bases: no enlarged row at base of caudal. Lateral-line continuous.*

Geographical distribution.—From the Red Sea and East coast of Africa through the seas of India to the Malay Archipelago and Australia.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Chærops anchorago*, D. 13/7, A. 3/9, L. l. 29-30. Red spots over the cheeks: a white vertical band down the sides from the bases of the fourth to the sixth dorsal spines. Andamans to the Malay Archipelago.

1. Chærops anchorago, Plate LXXXII, fig. 5.

Sparus anchorago, Bloch. v, p. 108, t. 276; Bl. Schn. p. 276.
Cossyphus anchorago, Trosch. Wiegm. Arch. 1840, p. 279.
Chærops anchorago, Günther, Catal. iv, p. 95.

B. vi, D. $\frac{13}{7}$, P. 15, V. 1/5, A. 3/9, C. 14, L. l. 29-30, L. tr. $3\frac{1}{2}$/9.

Length of head $3\frac{1}{3}$ to $3\frac{2}{3}$, of caudal $6\frac{3}{4}$ to 7, height of body $3\frac{1}{4}$ to $3\frac{1}{3}$ in the total length. *Eyes*—high up, diameter $4\frac{1}{2}$ to 5 in the length of head, 2 diameters from end of snout, and $1\frac{1}{4}$ apart. Profile from eye to snout rather abrupt. Height of head equals its length. Preopercle finely serrated. *Teeth*—a posterior canine in adults. *Scales*—on cheeks numerous, but scarcely imbricated. *Colours*—cheeks brownish, shot with yellow, and covered with scarlet spots. Back brownish, with a white vertical band descending from the bases of about the fourth to the sixth dorsal spines to below the last third of the pectoral: a light band over the free portion of the tail behind the base of the dorsal fin. In some specimens there are two to four wide dark cross bands. Dorsal fin with two dark bands and another descending down the first four rays to the back: posteriorly it is yellow and edged superiorly with orange: the other fins yellowish, a band along the ventral and sometimes a brown base to the pectoral.

Professor Peters Monats, Ak. Wiss. Berlin, 1868, p. 270, observes that this species is identical with *C. macrodon*, Bleeker, or *Labrus macrodontus*, Lacép. iii, pp. 451, 522; Cuv. and Val. xiii, p. 98; *Chærops meleagris*, Rüppell, Verz. Mus. Senck. Fische, p. 20; *Cossyphus macrodon*, Bleeker, Labr. p. 10; *Chærops macrodon*, Günther, Catal. iv, p. 94; Kner, Novara Fische, p. 248.

Habitat.—Andamans to the Malay Archipelago. It attains a large size, the one figured is 8·5 inches in length.

Genus, 2—Cossyphus,* *Cuvier and Val.*

Harpe, *Lepidoplois*, and *Pimelometopon*, Gill.

Branchiostegals six: pseudobranchiæ. Body oblong, compressed. Snout more or less pointed. Preopercle serrated or entire. The four anterior teeth conical and free: the lateral teeth in a single row, whilst a posterior canine is as a rule present: inferior pharyngeal teeth not confluent or pavement-like. A single dorsal fin with more spines (11-13) *than rays* (9-11): *the anal with three spines and more rays* (10-14) *than the soft dorsal. Scales of moderate size, those on the cheeks and opercles imbricated: the bases of the vertical fins scaled. No enlarged row of scales at the base of the caudal fin. Lateral-line continuous.*

Geographical distribution.—Red Sea, East coast of Africa, seas of India to the Malay Archipelago, and nearly all intertropical and adjacent seas.

The colours would seem to be subject to considerable variation in the same species. As a rule we find the dorsal fin has only twelve spines.

* *Cossyphus* as a Generic name has been frequently employed: by Fabr. in Coleop. 1792; Dumeril in Birds, 1802; Val. in Fishes, 1839; and ten years later by McClelland, who instituted this Generic term for a mutilated specimen of *Clarias.*

SYNOPSIS OF SPECIES.

1. *Cossyphus axillaris*, D. $\frac{12}{10}$, A. $\frac{3}{12}$, L. l. 34. Orange red, darkest superiorly, as a rule a black spot at base of pectoral and on the first few rays of dorsal and anal fins. Madagascar, Mauritius, seas of India.

2. *Cossyphus Diana*, D. $\frac{12}{10}$, A. $\frac{3}{10-12}$, L. l. 32-33. Reddish, three white spots between the lateral-line and base of dorsal fin: a small black spot at end of lateral-line, some dark spots on scales in last portion of the body above the lateral-line. Mozambique, Mauritius, seas of India to the Malay Archipelago.

1. **Cossyphus axillaris**, Plate LXXXII, fig. 3, (*variety.*)

Labrus axillaris, Benn. Proc. Zool. Soc. 1831, p. 166.

Cossyphus axillaris, Cuv. and Val. xiii, p. 131, pl. 371; Günther, Catal. iv, p. 103; Klunz. Verh. z. b. Ges. Wien, 1871, p. 549.

Cossyphus Neilli, Day, Proc. Zool. Soc. 1867, p. 560 (*variety*).

Moonjilli, Tamil.

B. vi, D. $\frac{12}{10}$, P. 16, V. 1/5, A. $\frac{3}{12}$, C. 14, L. l. 34, L. tr. 5/12.

Length of head 4, of caudal 7 to 8, height of body $3\frac{1}{2}$ to 4 in the total length. *Eyes*—diameter 4 to $4\frac{1}{2}$ in length of head, $1\frac{1}{3}$ to $1\frac{2}{3}$ diameters from end of snout, and $1\frac{1}{4}$ apart. The greatest height of the head equals its length behind the posterior nostril. Upper lip thick and with a broad anterior fold. Preopercle finely serrated. *Teeth*—a posterior canine present. *Fins*—caudal truncated or slightly emarginate. *Colours*—head and upper two-thirds of the back orange red. Fins yellow, with a black base to the pectoral, and a black blotch on the upper two-thirds of the first few dorsal and anal rays.

Variety.—A. Amongst Sir W. Elliott's drawings is one of this fish, in which the black markings are seen in the form of deep orange blotches.

Variety.—B. (*C. Neilli*). A second variety (of which the specimen from which it was figured has been preserved), shows the head and upper two-thirds of the body as far as the middle of the dorsal fin of a deep orange red, as is also the first half of the soft anal, the posterior half of both these fins yellow. Caudal and free portion of the tail orange scarlet, (not so in my specimens). Pectoral flesh-coloured, lips reddish.

The series appears to conclusively prove that the colours of this species are subject to great variation. The one figured (life-size) is of the second variety (*C. Neilli*), and from Madras.

The species adverted to by Jerdon, M. J. L. and Sc. 1851, p. 135, are as follows:—*Moonjilli*, Tam. is *C. axillaris* variety *Neilli*: *Kul moonjilli* is *C. Diana*.

Habitat.—Madagascar, Mauritius, seas of India to New Hebrides.

2. **Cossyphus Diana**, Plate LXXXVII, fig. 3.

Labrus Diana, Lacép. iii, pp. 451, 522, pl. 32, f. 1.

Cossyphus Diana, Cuv. and Val. xiii, p. 127; Peters. Fische Moss. Pr. Ak. Berl. 1855, p. 451; Bleeker, Sumatra, vii, p. 86, and Atl. Ich. i, p. 159, t. 38, fig. 1; Günther, Catal. iv, p. 104; Klunz. Verh. z. b. Ges. Wien, 1871, p. 549.

Labrus leucostictícus, Bennett, Proc. Zool. Soc. 1831, p. 166.

Cossyphus spilotes, Guich. in Maillard, Notes on the Isle of Reunion, App. p. 14.

B. vi, D. $\frac{12}{10}$, P. 16, V. 1/5, A. $\frac{3}{10-12}$, C. 14, L. l. 32-33, L. tr. 4/12.

Length of head $3\frac{1}{3}$ to $3\frac{1}{2}$, of caudal 6, height of body $3\frac{1}{2}$ in the total length. *Eyes*—diameter 1/5 of length of head, 2 diameters from end of snout, and $1\frac{1}{4}$ apart. Snout produced, rather pointed: lips thick and broad: preopercle finely serrated. *Teeth*—a posterior canine in either jaw. *Fins*—no elongated ventral ray: caudal truncated. *Colours*—reddish, three large white spots between the lateral-line and the base of the dorsal fin, two being below the spines and one beneath the rays. Dark spots on the end of the scales from the commencement of the soft dorsal to the caudal above the lateral-line: a black spot at the posterior end of the lateral-line: fins diaphanous.

Some specimens have a white spot before the commencement of the lateral-line. Others show a large black spot upon the ventral, and two more on the anal fins.

Habitat.—Seas of India: a specimen $5\frac{1}{2}$ inches long exists in the Calcutta Museum, taken in the Indian Ocean. There is also a figure of this species amongst Sir Walter Elliot's drawings, it was captured at Waltair. The one figured (life-size) is from the Malay Archipelago, and for it I am indebted to Dr. Hubrecht of the Leyden Museum.

Genus, 3—LABROIDES, *Bleeker.*

Diproctacanthus, Bleeker; *Fissilabrus*, Kner.

Branchiostegals five: pseudobranchiæ. Body oblong, compressed. Gill-membranes attached to the isthmus. Snout pointed, lips prominent, one of them having a notch anteriorly. Preopercle entire. A band of small teeth in the jaws, with a pair of curved canines in either jaw, the upper pair being received between the lower ones when the mouth is closed: a posterior canine tooth: inferior pharyngeal teeth not confluent or pavement-like. A single dorsal

fin with usually less spines (9) *than rays* (9-12); *anal with two or three spines, and rays nearly similar to those of the dorsal* (9-10). *Scales on body of moderate size, they are extended over the opercles, cheeks and base of the vertical fins: no enlarged row at base of caudal fin. Lateral-line continuous.*

Geographical distribution.—Red Sea, seas of India to the Malay Archipelago.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Labroides dimidiatus*, D, $\frac{9}{10-12}$, A. $\frac{3}{10}$, L. l. 46-50, L. tr. 4/15. Lips notched. A black band from the eye to the tail, widening posteriorly and covering the caudal fin, except its angles. Red Sea and seas of India to the Malay Archipelago.

1. **Labroides dimidiatus**, Plate LXXXVII, fig 1.

Labrus latovittatus, Rüpp, N. W. Fische, p. 7, t. ii, f. 2, (not Lacépède).
Cossyphus dimidiatus, Cuv. and Val. xiii, p. 136.
Labroides latovittatus, Bleeker, Amboina, viii, p. 73, and Atl. Ich. i, p. 155, t. 44, f. 1.
Labroides dimidiatus, Günther, Catal. iv, p. 119.
Fissilabrus latovittatus, Kner, Char. et Syst. Labr. p. 14.

B. v, D. $\frac{9}{10-12}$, P. 13, V. 1/5, A. $\frac{3}{10}$, C. 14, L. l. 46-50, L. tr. 4/15.

Length of head $3\frac{1}{2}$ to $3\frac{3}{4}$, of caudal 5, height of body $3\frac{1}{2}$ to 4 in the total length. *Eyes*—diameter 1/4 of length of head, 1 diameter from end of snout, and $1\frac{1}{2}$ apart. Opercles entire. The lips emarginate anteriorly. Height of head equals about $1\frac{3}{4}$ in its length. *Fins*—third anal spine the longest: caudal cut square. *Lateral-line*—curves opposite the posterior end of the dorsal fin. *Colours*—nearly white, with a black band through the eye to the upper third of the base of the caudal fin when it bends slightly to reach the centre of that fin: a black band along the anal, which passes to the caudal and joins the upper band at the end of that fin: a dark band along the dorsal fin. Two specimens, captured at Waltair, exist in Sir Walter Elliot's collection: the figure is taken from one of them. My Andamanese specimen has twelve dorsal rays, the last being divided into two: it has also two posterior canines in either jaw.

Habitat.—Red Sea, Coromandel coast of India, Andamans to the Malay Archipelago.

Genus, 4—Cheilinus, *(Lacép.) Cuvier.*

Oxycheilinus et *Crassilabrus*, Gill.

Branchiostegals five. Body oblong, compressed. Preopercle entire. Lower jaw not produced backwards. Teeth in one row, two canines in either jaw, none being directed outwards: no posterior canine: inferior pharyngeal teeth not confluent or pavement-like. A single dorsal fin, the number of spines (9-10), *being about equal to the rays* (9-11). *Anal with three spines, the third being the longest, its rays rather less* (8-9) *than those of the dorsal. Scales large* (20 *to* 23 *in a longitudinal row*), *two rows on the cheeks, the last three at the base of the caudal fin enlarged. Lateral-line interrupted.*

Geographical distribution.—Red Sea, and east coast of Africa through the seas of India to the Malay Archipelago, China, and beyond.

SYNOPSIS OF SPECIES.

1. *Cheilinus chlorurus*, D. $\frac{10}{9}$, A. $\frac{3}{8}$, L. l. 22. Caudal trilobed, sometimes rounded in the young. Olive brown, cheeks with yellow spots and streaks. Ventral, anal, and caudal with small yellow dots. Bay of Bengal to Malay Archipelago and beyond.

2. *Cheilinus trilobatus*, D. $\frac{9}{10}$, A. $\frac{3}{8}$, L. l. 20. Caudal rounded except in the adult, when it is trilobed. Grayish-brown, with red spots and stripes on the head. Seas of India to the Malay Archipelago and beyond.

3. *Cheilinus fasciatus*, D. $\frac{9}{10}$, A. $\frac{3}{8}$, L. l. 21-23. Yellowish, with six or seven dark vertical bands. Seas of India to the Malay Archipelago and beyond.

1. **Cheilinus chlorurus**, Plate LXXXII, fig. 6.

Sparus chlorurus, Bloch, v, p. 24, t. 260; Bl. Schn. p. 269; Lacép. iv, pp. 55, 163.
Thalliurus Blochii, Swainson, Fishes, ii, p. 230.
Cheilinus guttatus, Bleeker, Labr. Cycl. p. 36.
Cheilinus decacanthus, Bleeker, Banda, i, p. 256.
Cheilinus chlorurus, Cuv. Règne, Anim.; Bleeker, Atl. Ich. i, p. 65, t. 27, f. 3; Günther, Catal. iv, p. 128; Kner, Novara Fische, p. 251.

B. v, D. $\frac{10}{9}$, P. 11, V. 1/5, A. $\frac{3}{8}$, C. 12, L. l. 22, L. tr. 2/8.

Length of head $3\frac{3}{4}$, of caudal $4\frac{1}{2}$, height of body 3 in the total length. *Eyes*—diameter $4\frac{3}{4}$ in the length of head, $1\frac{1}{3}$ diameter from end of snout and also apart. The maxilla reaches to below the front edge of the orbit. *Teeth*—canines of moderate size. *Fins*—ventral reaches the anal rays: outer caudal rays produced, causing the fin to appear three lobed: sometimes rounded in the young. *Lateral-line*—tubes much branched. *Colours*—olive-brown, with round yellow spots on the cheeks, and a streak of the same colour from the eye to

the angle of the mouth: body sparingly dotted with yellow, a yellow mark covers the last few dorsal rays and is continued on to the back of the free portion of the tail: spinous dorsal olive, with red edges, and spines with brown dots: soft dorsal reddish: anal, ventral, and caudal with small yellow dots.

In the "Fishes of Zanzibar," the authors observe of *Cheilinus punctatus*, Bennett, Proc. Zool. Soc. i, p. 167=*C. punctulatus*, C. V. xiv, p. 87, pl. 396, "this species is very closely allied to *C. chlorurus*, Bl., and it may be regarded as the western representative of that fish" (p. 89).

Habitat.—Bay of Bengal to the Malay Archipelago and beyond. The specimen figured is from the Andamans, and is 7·7 inches in length.

2. Cheilinus trilobatus, Plate LXXXII, fig. 4.

Cheilinus trilobatus, Lacép. iii. pp. 529, 537, t. 31, f. 3; Cuv. Règ. An. Poiss. pl. 86, f. 2; Rüpp. Atl. Fische, p. 22; Cuv. and Val. xiv, p. 79; Bleeker, Labr. p. 34, and Atl. Ich. i, p. 66, t. 27, f. 2; Günther, Catal. iv, p. 126; Klunz, Verh. z. b. Ges. Wien, 1871, p. 553.

Labrus trilobatus, Shaw, Zool. iv, p. 487.

Cheilinus sinuosus, Quoy and Gaim. Voy. Uranie, Poiss. p. 278; Cuv. and Val. xiv, p. 95, *(immature)*.

Cheilinus rivulatus, Cuv. and Val. xiv, p. 86.

Cheilinus nebulosus, Richards. Ich. China, p. 261.

Cheilinus tetrazona, Bleeker, Sumatra, ii, p. 293.

B. v, D. $\frac{9}{10}$, P. 12, V. 1/5, A. $\frac{3}{8}$, C. 13, L. l. 20, L. tr. $2\frac{1}{2}$/7.

Length of head $3\frac{2}{3}$, of caudal 7, height of body $3\frac{1}{4}$ in the total length. *Eyes*—diameter $5\frac{1}{2}$ in the length of head, $1\frac{1}{2}$ diameters from the end of snout and also apart. Profile over snout rather concave. The maxilla reaches rather above 1/2 way to below the orbit. *Teeth*—canines rather small. *Fins*—ventral does not reach the anal: caudal rounded except in some large specimens, when it is usually trilobed. The figure in Lacépède shows the caudal deeply trilobed. *Lateral-line*—tubules branched. *Colours*—grayish-brown, with red spots and narrow stripes on the head, the last being mostly before and below the eyes: some of the scales on the body with red spots. Vertical fins green, dorsal and anal having red margins: a dark spot at the base of the middle dorsal rays, sometimes extending to the posterior one.

In Cuv. and Val. xiv, p. 85, *Sparus chlorurus*, Bl. is considered identical with this species.

Habitat.—Red Sea, East coast of Africa, Andamans to the Malay Archipelago and beyond. The one figured is $9\frac{1}{2}$ inches long, and from the Andamans. It grows to at least three feet in length.

3. Cheilinus fasciatus, Plate LXXXIV, fig. 1.

Sparus fasciatus, Bloch, v, p. 18, t. 257; Bl. Schn. p. 269; Lacép. iv, pp. 39, 127; Swainson, Fishes, ii, p. 229.

Labrus enneacanthus, Lacép. iii, pp. 433, 480.

Cheilinus fasciatus, Cuv. Règ. Anim.; Rüpp. Atl. Fische, p. 23 (pt.); Cuv. and Val. xiv, p. 92; Rüpp. N. W. Fische, p. 18; Swainson, Fishes, ii, p. 299; Bleeker, Labr. p. 31, and Atl. Ich. i, p. 67, t. 26, f. 2; Günther, Catal. iv, p. 129; Kner, Novara Fische, p. 251: Klunz. Verh. z. b. Ges. Wien, 1871, p. 555.

B. v, D. $\frac{9}{10}$, P. 12, V. 1/5, A. $\frac{3}{8}$, C. 13, L. l. 21-23, L. tr. 2/7, Vert. 10/13.

Length of head $3\frac{1}{2}$, of caudal $4\frac{2}{3}$, height of body 3 to $3\frac{1}{3}$ in the total length. *Eyes*—diameter 5 in the length of head, 2 diameters from the end of snout and also apart. The greatest height of the head equals its length. The outer end of the maxilla is curved forwards as a hook-like process into the concavity of which the outer extremity of the premaxillary is received. *Fins*—ventral rounded, not reaching to the anal: caudal truncated, having its upper and lower rays produced. *Lateral-line*—tubules unbranched. *Colours*—yellowish, with six or seven dark or black bands: black spots on the nape, opercles and pectoral region, also some scattered over the body. Caudal with a crescentic vertical black band, and a black posterior edge, a few narrow dark bands between the two. Dorsal with a light edge having a dark base, some of the body bands are extended on to this fin. A large black blotch on the ventral.

Habitat.—Red Sea, through those of India to the Malay Archipelago and beyond. Bloch's specimen from the Indian Ocean is still preserved in spirit in Berlin. The specimen figured is 8·3 inches in length, and from the Malay Archipelago: I am indebted for it to Dr. Hubrecht of the Leyden Museum.

Genus, 5—Epibulus, *Cuvier*.

Branchiostegals five. Body oblong, compressed. Preopercle entire. Mouth very protractile, the ascending processes of the premaxillaries, also the mandibles and tympanics, being elongated. Teeth in one row, and two canines in either jaw, but no posterior canine: inferior pharyngeal teeth not confluent or pavement-like. A single dorsal fin with less spines (9) than rays (10): three anal spines, the rays less numerous than those of the dorsal. Scales large, two rows on the cheeks, three enlarged ones at base of caudal fin. Lateral-line interrupted.

Geographical distribution.—Seas of India to the Malay Archipelago.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Epibulus striatus*, D. $\frac{9}{10}$, A. $\frac{3}{8}$. L. l. 19, L. tr. 2/7. Vertical narrow white bands. Andamans.

1. Epibulus striatus, Plate LXXXVII, fig. 2 ($\frac{2}{1}$).

Day, Proc. Zool. Soc. 1870, p. 697.

B. v, D. $\frac{9}{10}$, P. 11, V. 1/5, A. $\frac{3}{8}$, C. 13, L. l. 19, L. tr. 2/7.

Length of head above 2/5, of caudal 2/11, height of body 2/5 of the total length. *Eyes*—diameter 2/7 of length of head, 1 diameter from end of snout and apart. The posterior extremity of the lower jaw extends to below the hind edge of the orbit, and the ascending processes of the premaxillaries to opposite the posterior third of the orbit. *Fins*—not elongated: the interspinous membrane prolonged beyond the spines of both the dorsal and anal fins. *Lateral-line*—interrupted opposite the middle of the soft dorsal. *Colours*—a white line between the orbits, and two more on the head, the first of which runs from the eye to the snout: the second descending from the orbit meets one from the opposite side. Body greenish-brown, with five narrow milk-white vertical bands, the first from the opercles to before the ventral fins, the next from the second dorsal spine to the end of the ventral fin, the third from the centre of the dorsal spines to the base of the anal, the fourth from the end of the dorsal fin to the end of the anal, the fifth round the free portion of the tail. Soft dorsal and termination of the anal white, the remainder of the fins dark coloured.

Habitat.—Andamans, where a single specimen $1\frac{1}{2}$ inches in length was captured, it is figured twice life-size.

Genus, 6—Anampses, *Cuvier*.

Branchiostegals six: body oblong, compressed. Preopercle entire. Teeth in jaws in one row, the two front ones in each being prominent, directed forwards, and compressed, with cutting edges: no posterior canine tooth: inferior pharyngeal teeth not confluent or pavement-like. A single dorsal fin, the spines (9) being less than the rays (12): anal with three spines, and the same number of rays as the dorsal. Scales from rather large to a medium size: none on the head, no enlarged row at base of caudal fin. Lateral-line continuous.

Geographical distribution.—Red Sea, east coast of Africa, through the seas of India to the Malay Archipelago and beyond.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Anampses cœruleo-punctatus*, D. $\frac{9}{12}$, A. $\frac{3}{12}$, L. l. 27, L. tr. 4/10. Blue lines from eyes, body and fins spotted with blue. Andamans to the Malay Archipelago and beyond.

1. Anampses cœruleopunctatus, Plate LXXXVII, fig. 4.

? *Anampses diadematus*, Rüpp. N. W. Fische, p. 21, t. vi, f. 3; Günther, Catal. iv, p. 137; Klunz. Verh. z. b. Ges. Wien, 1871, p. 533.

Anampses cœruleopunctatus, Rüpp. Atl. Fische, p. 42, t. x, f. 1; Cuv. and Val. xiv, p. 5; Cuv. Règ. Anim. Ill. Poiss. pl. 87, f. 2; Bleeker, Atl. Ich. i, p. 104, t. xxiv, f. 2; Günther, Catal. iv, p. 135; Klunz. Verh. z. b. Ges. Wien, 1871, p. 534.

B. vi, D. $\frac{9}{12}$, P. 12, V. 1/5, A. $\frac{3}{12}$, C. 13, L. l. 27-28, L. tr. 4/18, Vert. 11/15.

Length of head $3\frac{1}{2}$, of caudal 7, height of body 3 in the total length. *Eyes*—diameter 5 in length of head, $1\frac{1}{2}$ diameters from end of snout, and 2 apart. The height of the head equals its length behind the angle of the mouth. The maxilla reaches half-way to below the orbit. *Colours*—reddish-brown, several bluish vertical lines radiate from the orbit: each scale on the body with a blue spot surrounded by a dark ring, fins reddish, the dorsal with three rows of blue spots, the anal with two or three, the caudal likewise blue spotted, all these fins with light edges. The spots on the middle of the body are sometimes apt to assume the appearance of vertical lines.

Two specimens to 7 inches in length exist in the Calcutta Museum, being those referred to in the J. A. Soc. Beng. 1860, as presented by Mrs. Edwards from the Andamans.

Habitat.—Red Sea, east coast of Africa, Mauritius, seas of India to the Malay Archipelago and beyond. I am indebted to Dr. Sauvage and the officials of the Jardin des Plantes in Paris for the specimen figured, it came from the Marquesas.

Genus, 7—Hemigymnus, *Günther*.

Halichœres, sp. Rüppell: *Tautoga*, sp. Cuv. and Val.: *Erychthys* and *Hemiulis*, Swainson.

Branchiostegals six: body oblong, compressed. Preopercle entire: lips very fleshy. Teeth in a single row, two canines anteriorly in either jaw, the lower ones being received when the mouth is closed between the upper pair: generally a posterior canine: inferior pharyngeal teeth not confluent or pavement-like. A single dorsal fin, with less spines (9) than rays (11): anal with three spines and the same number of rays (11) as the soft dorsal. Scales large, none on the opercles, but a strip of very small ones on the cheek: no enlarged row at base of caudal fin. Lateral-line continuous.

Geographical distribution.—Red Sea, east coast of Africa, seas of India, to the Malay Archipelago and Australia.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Hemigymnus melapterus*, D. $\frac{9}{11}$, A. $\frac{3}{11}$, L. l. 29, L. tr. 5/14. Scales dotted with blue. East coast of Africa, seas of India to Australia and beyond.

2. *Hemigymnus fasciatus*, D. $\frac{9}{11}$, A. $\frac{3}{11}$, L. l. 28-29. Bluish, with wide vertical bands. Red Sea, seas of India to the Malay Archipelago.

1. Hemigymnus melapterus, Plate LXXXIV, fig. 2.

Labrus melapterus, Bl. t. 285; Bl. Schn. p. 247 *(L. melampterus)*.
Tautoga melapterus, Cuv. and Val. xiii, p. 311; Bleeker, Verh. Bat. Gen. xxii, p. 16; Richards. Ann. and Mag. 1843, xi, p. 358.
Hemiulis melapterus, Swainson, Fishes, ii, p. 228.
Hemigymnus melanopterus, Günther, Catal. iv, p. 139; Kner, Novara Fische, p. 253.
Labrichthys bicolor, Day, Proc. Zool. Soc. 1870, p. 696 *(young)*.

B. vi, D. $\frac{9}{11}$, P. 13, V. 1/5, A. $\frac{3}{10}$, C. 15, L. l. 27-29, L. tr. 5/14.

Length of head $3\frac{1}{4}$ to $3\frac{1}{2}$, of caudal 6 to $6\frac{3}{4}$, height of body $2\frac{3}{4}$ to $3\frac{1}{4}$ in the total length. *Eyes*—diameter 4 in the young, to 6 or $6\frac{1}{2}$ in the length of head in the adult, 2 to 3 diameters from end of snout, and $1\frac{1}{2}$ to 2 apart. Lips very thick, the lower one notched in the middle, and each lateral portion pendant like a wattle. *Teeth*—a posterior canine is usually present but concealed by the skin. *Scales*—about three rows of very small ones on the cheeks. *Colours*—bluish, brown above, becoming yellowish beneath: a dark mark behind the orbit: scales dotted with blue: dorsal and anal light at their external third, followed by bluish band, external to which they are darker: caudal dark. In the *young*, the body behind a line from the commencement of the dorsal to the base of the anal, dark violet, some of the lower scales being blue spotted: anterior to this nearly white beneath, but darker along the top of the head, whilst most of the scales have more or less dark spots.

Habitat.—Zanzibar, Andamans, to the Malay Archipelago and Australia. The one figured is from the Andamans, where it is very common, and attains a large size.

2. Hemigymnus fasciatus.

Mullus fasciatus, Thunb. Reise nach Japan, iv, p. 351, t. 314.
Labrus fasciatus, Bl. t. 290; Bl. Schn. p. 249.
Sparus zenephorus et *meaco*, Lacép. iv, pp. 155, 160.
Labrus fuliginosus et *melapteronotus*, Lacép. iii, pp. 437, 450, 492, 493, and 516.
Halichœres sexfasciatus, Rüpp. N. W. Fische, p. 18, t. v, f. 3.
Scarus quinquefasciatus, Bennett, Fish. Ceylon, p. 23, pl. xxiii.
Tautoga fasciata, Cuv. and Val. xiii, p. 303, pl. 379; Bleeker, Batav. p. 484; Jerdon, M. J. Sc. 1851, p. 135.
? Tautoga Mertensii, Cuv. and Val. xiii, p. 308.
Tautoga sexfasciata, Cuv. and Val. xiii, p. 309.
Cheilinus Blochii, Cuv. and Val. xiv, p. 108.
Erychthys quinquefasciatus, Swainson, Fishes, ii, p. 226.
Cheilinus fasciatus, Swainson, Fishes, ii, p. 229.
? Tautoga leucomos, Bleeker, Biliton, iv, p. 239.
Hemigymnus fasciatus, Günther, An. Nat. Hist. 1861, p. 386, and Catal. iv, p. 138; Bleeker, Atl. Ich. i, p. 141, t. xlvi, f. 2; Klunz. Verh. z. b. Ges. Wien, 1871, p. 547.
Hemigymnus sexfasciatus, Günther, Catal. iv, p. 139.
? Hemigymnus leucomos, Bleeker, Atl. Ich. p. 142, t. xliv, f. 6; Günther, Catal. iv, p. 139.
Panoo-girawah, "Worm parrot," Cingalese.

B. vi, D. $\frac{9}{11}$, P. 14, V. 1/5, A. $\frac{3}{11}$, C. 14, L. l. 28-29, L. tr. 5/11.

Length of head $3\frac{2}{3}$ to 4, of caudal 6 to $6\frac{1}{4}$, height of body $3\frac{1}{3}$ to $3\frac{1}{2}$ in the total length. *Eyes*—diameter 5 to 6 in length of head, nearly 3 diameters from end of snout. Lips very thick, folded; the lower one notched in the centre and pendant like a wattle. *Teeth*—small ones sometimes present at the angle of the mouth. *Fins*—caudal truncated. *Scales*—a band of small ones across the cheeks. *Colours*—bluish, with broad rivulated red bands on the head, and a brown spot behind the eye: these marks appear to be sometimes absent. Five vertical brownish cross bands, wider than the ground colour, descend from the back to the abdominal surface. Dorsal and anal brownish, the lower with blue spots and a blue edge, having a red band below it: anal with two blue longitudinal bands. Caudal brownish, with a blue vertical band. Pectoral yellowish. Outer two-thirds of ventral dark.

Habitat.—Red Sea, east coast of Africa, seas of India to the Malay Archipelago.

Genus, 8—Stethojulis, *Günther.*

Julis, sp. Cuv. and Val.

Branchiostegals six: body oblong and compressed. Preopercle entire: no anterior canine teeth; a posterior canine: inferior pharyngeal teeth not confluent or pavement-like. A single dorsal fin with less spines (9) *than rays* (11): *anal with three spines and the same number of rays as the soft dorsal. Scales of moderate size: none on the head: no enlarged row at base of caudal fin. Lateral-line continuous.*

Geographical distribution.—East coast of Africa, seas of India, to the Malay Archipelago and beyond.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Stethojulis strigiventer*, D. $\frac{9}{11}$, A. $\frac{2}{11}$, L. l. 26-27. A brown white-edged band from the snout to below the eye: lines and dots along the sides. A black spot on last dorsal ray, another generally at the base of the caudal fin. Seas of India to the Malay Archipelago,

1. Stethojulis* strigiventer, Plate LXXXIV, fig. 7.

Julis strigiventer, Bennett, Proc. Zool. Soc. 1832, p. 184; Cuv. and Val. xiii, p. 468; Bleeker, Banda, i, p. 251; Peters, Monats. Ak. Wiss. 1855, p. 434.

Halichœres strigiventer, Kner, Labr. p. 12.

Stethojulis strigiventer, Günther, Annal. and Mag. Nat. Hist. 1861, p. 386, and Catal. iv, p. 140; Bleeker, Atl. Ich. i, p. 135, t. 43, f. 1; Kner, Novara Fische, p. 253.

B. vi, D. $\frac{9}{11}$, P. 15, V. 1/5, A. $\frac{2}{11}$, C. 14, L. l. 26-27, L. tr. 2/9.

Length of head $3\frac{1}{2}$ to $3\frac{3}{4}$, of caudal $5\frac{1}{3}$, height of body 4 to $4\frac{1}{4}$ in the total length. *Eyes*—diameter 4 to $4\frac{1}{2}$ in the length of head, $1\frac{1}{4}$ to 2 diameters from the end of snout, and $1\frac{1}{4}$ apart. *Fins*—ventral rather short, caudal rounded. *Colours*—light brown, becoming yellowish on the abdomen: a brown band having a white lower edge passes from the snout and angle of the mouth below the eye to the opercle: several longitudinal yellow lines and some black dots along the sides, especially in the lower half of the body: a black spot on the last dorsal ray, another at the base of the caudal fin, which last mark is apparently sometimes absent.

In "the Fishes of Zanzibar" a variety is given as follows: "bright green: lower part of the sides with several pale-green longitudinal lines, on which there are some black dots. A blue, brown-edged band from mouth, below eye, to operculum: sometimes an ocellated spot at the end of the dorsal and on the upper part of the base of the caudal."

Habitat.—From East Africa through the seas of India to the Malay Archipelago and China. It is very abundant at the Nicobars and Andamans, from the latter of which localities the specimen figured was obtained.

Genus, 9—Platyglossus, *(Klein)*, *Günther.*

Halichœros, sp. Rüppell; *Julis*, sp. Cuv. and Val.; *Macropharyngodon*, *Güntheria*, and *Hemitautoga*, Bleeker; *Chœrojulis*, Gill.

Body oblong, compressed. Anterior teeth conical, but neither bent outwards nor backwards: a posterior canine: inferior pharyngeal teeth not confluent or pavement-like. A single dorsal fin with less spines (9) *than rays* (10-14): *anal with three spines and about the same number of rays* (11-14) *as the soft dorsal. Scales rather large: those on the thorax smaller than on the remainder of the body: none on the head (except a few rudimentary ones behind the eye in two or more species), no enlarged row at base of caudal fin. Lateral-line continuous.*

Geographical distribution.—Red Sea, seas of India, and generally tropical and adjacent seas.

SYNOPSIS OF SPECIES.

1. *Platyglossus notopsis*, D. $\frac{9}{13}$, A. $\frac{3}{12}$, L. l. 27-29. Two black spots on dorsal fin, the first between first and second spines, the largest between third and sixth rays. Andamans to the Malay Archipelago.

2. *Platyglossus Hyrtlii*, D. $\frac{9}{12-13}$, A. $\frac{3}{12}$, L. l. 27-28. Two brownish-black longitudinal bands. Andamans to the Malay Archipelago.

3. *Platyglossus marginatus*, D. $\frac{9}{12-13}$, A. $\frac{3}{11}$, L. l. 27. Undulating green streaks edged with blue on head and anterior half body, and streaks on vertical fins. Red Sea, through seas of India to the Malay Archipelago.

4. *Platyglossus Dussumieri*, D. $\frac{9}{12}$, A. $\frac{3}{12}$, L. l. 28-29. Bluish-green, scales chequered with dull purplish red. A black spot at base of pectoral. A bluish ocellus between fifth and seventh dorsal spines. East coast of Africa, seas of India to the Malay Archipelago and beyond.

5. *Platyglossus leparensis*, D. $\frac{9}{12}$, A. $\frac{3}{12}$, L. l. 26-28. Brown streak from eye to snout, and a silvery band from eye to tail, with four and five more below it. Two spots on dorsal fin. Andamans to the Malay Archipelago.

6. *Platyglossus hortulanus*, D. $\frac{9}{11-12}$, A. $\frac{3}{11}$, L. l. 28. Broad bluish streaks on the head, and bluish spots on first part of the back. From one to three yellow spots on back below the base of the dorsal fin. Red Sea, seas of India to the Malay Archipelago and beyond.

* *Julis Finlaysonii*, Cuv. and Val. xiii, p. 471, may be a *Stethojulis*. The description was made from a drawing executed in Siam by Major Finlayson. The colours are greenish. Commencing at the corner of the mouth and passing below the eye is a light brown lateral band covered with deeper coloured spots. The dorsal light pink, bordered with red, having a red spot at the base of each spine and ray: the anal is figured as similar, but the basal spots are not distinct in Sir W. Elliot's figure. Caudal bluish, with three oblique bands on either lobe. There is also a row of red spots between the lateral band and the back in Sir W. Elliot's figure. Under surface of the head silvery, with a tinge of orange. Amongst Sir W. Elliot's drawings of fishes I found one which agrees with Major Finlayson's, it is marked *Julis*.

Habitat.—Siam (not Ceylon) is noted on the original drawing, and Madras. See Jerdon, M. J. L. and Sc. 1851, p. 135.

7. *Platyglossus kawarin*, D. $\frac{9}{11}$, A. $\frac{3}{11}$, L. l. 28-29. Head with blue lines and spots. Each scale below lateral-line with a central rosy spot forming longitudinal bands. A black spot from last dorsal spine to second ray. Andamans to the Malay Archipelago.

8. *Platyglossus nebulosus*, D. $\frac{9}{11}$, A. $\frac{3}{11}$, L. l. 28. Body with light and dark blotches and spots. Two black spots on dorsal fin. Red Sea and seas of India to the Malay Archipelago.

9. *Platyglossus scapularis*, D. $\frac{9}{11}$, A. $\frac{3}{11}$, L. l. 27. A broad red, blue-edged band from the shoulder to the back of the tail. Red Sea, seas of India to the Malay Archipelago.

10. *Platyglossus bimaculatus*, D. $\frac{9}{10}$, A. $\frac{3}{11}$, L. l. 27. Violet bands radiating from the eye. A black white-edged spot under the ninth or tenth scales of the lateral-line. Red Sea, East coast of Africa, seas of India.

1. Platyglossus notopsis, Plate LXXXIV, fig. 4.

Julis notopsis, (Kuhl. and v. Hass.) Bleeker, Sumatra, ii, p. 290.
? *Julis notopsis*, Cuv. and Val. xiii, p. 485.
Julis phaiopus, Bleeker, Sumatra, ii, p. 291 (old age).
Platyglossus notopsis, Bleeker, Labr. p. 11, and Atl. Ich. i, p. 111, t. xli, figs. 1 and 2; Günther, Catal. iv, p. 154.

B. vi, D. $\frac{9}{13}$, P. 13, V. 1/5, A. $\frac{3}{12}$, C. 14, L. l. 27-29, L. tr. 3/11.

Length of head 4 to $4\frac{1}{2}$, of caudal 6 to $6\frac{1}{2}$, height of body $3\frac{1}{2}$ to $3\frac{2}{3}$ in the total length. *Eyes*—diameter $3\frac{1}{2}$ in length of head, about 1 diameter from end of snout and also apart. *Fins*—dorsal spines two-thirds the height of the rays: caudal rounded. *Colours*—purplish-brown, with four or five red longitudinal bands. Two black ocelli on the dorsal fin, largest in the young: the smaller one between the first and second spines: the larger between the third and sixth rays, and being encircled by a light ocellus, there are one or two rows of round light spots on the fin posterior to the large black one: caudal with a yellow band at its base, and yellow edges. The young are much darker than the adults, having light longitudinal narrow lines and three white spots on the back, the anterior of which is usually continued on to the dorsal fin between the sixth and seventh spines: the third spot is on the summit of the free portion of the tail.

Habitat.—Andamans to the Malay Archipelago. The one figured is life-size.

2. Platyglossus Hyrtlii, Plate LXXXVIII, fig. 1.

Julis mola, pt. Cantor, Catal. p. 238; Jerdon, M. J. L. and Sc. 1861, p. 135.
Julis (Halichœres) Hyrtlii, Bleeker, Manado, p. 60.
Halichœres Hyrtlii, Bleeker, Labr. p. 286, and Atl. Ich. i, p. 121, t. 39, f. 2.
Platyglossus hyrtelii, Günther, Catal. iv, p. 149.
Platyglossus Hyrtlii, Peters, Monats. Akad. Wiss. Berlin, 1868, p. 270.
Platyglossus bifasciatus, Steind. Verh. z. b. Ges. Wien, 1866, p. 477, t. v, f. 2.

B. vi, D. $\frac{9}{12-13}$, P. 14, V. 1/5, A. $\frac{3}{12}$, C. 14, L. l. 27-28, L. tr. 2/12.

Length of head $4\frac{1}{3}$ to $4\frac{1}{2}$, of caudal 7, height of body $4\frac{1}{4}$ to 5 in the total length. *Eyes*—diameter 5 in length of head, nearly 2 diameters from end of snout, and $1\frac{1}{4}$ apart. *Fins*—caudal rounded. *Colours*—olive colour along the back, becoming white along the abdomen: two brownish-black longitudinal bands: the superior united on the snout with that of the opposite side, is continued along the side of the base of the dorsal fin: the inferior commencing on the snout passes through the eye to the centre of the base of the caudal fin where it ends in a black spot, in its course it is interrupted on the opercle by a bright red spot. Dorsal fin anteriorly with two, posteriorly with three rows of spots, the reticulations forming which are very distinct between the first and third spines. Caudal similarly reticulated. Pectoral with a dark spot superiorly at its base.

Amongst my Andamanese fish is one of the young of this species 1 inch in length. For the specimen figured, which is from the Malay Archipelago, I am indebted to Dr. Hubrecht of Leyden.

Habitat.—Andamans to the Malay Archipelago.

3. Platyglossus marginatus, Plate LXXXIV, figs. 5 and 6 *(variety.)*

Halichœres marginatus, Rüpp. N. W. Fische, p. 16.
Julis marginata, Cuv. and Val. xiii, p. 490.
Julis annularis, (Kuhl. and v. Hass.) Cuv. and Val. xiii, p. 482; Kner, Labr. p. 12; Bleeker, Sumatra, 1853, p. 513.
Platyglossus annularis, Bleeker, Proc. Zool. Soc. 1861, p. 411.
Platyglossus marginatus, Bleeker, Labr. p. 283, and Atl. Ich. i, p. 109, t. xli, f. 3; Günther, Catal. iv, p. 160; Klunz. Verh. z. b. Ges. Wien, 1871, p. 545.

B. vi, D. $\frac{9}{12-13}$, P. 13, P. 1/5, A. $\frac{3}{11}$, C. 15, L. l. 27, L. tr. $3\frac{1}{2}$/10.

Length of head $4\frac{1}{3}$ to $4\frac{2}{3}$, of caudal $6\frac{1}{3}$, height of body $3\frac{1}{2}$ to $3\frac{2}{3}$ in the total length. *Eyes*—diameter $4\frac{1}{2}$ to 5 in the length of head, $1\frac{2}{3}$ to 2 diameters from end of snout, and $1\frac{1}{3}$ apart. Dorsal profile somewhat concave above the orbits. *Fins*—caudal slightly rounded. *Colours*—blackish-green: head and anterior part of the body with undulating grass-green streaks edged with blue. Numerous red blue-edged streaks and spots on

the vertical fins, which have blue margins: a large vertical green crescent-shaped mark covered with light spots on the middle of the caudal fin, basal half of pectoral black. *Variety.*—A specimen (fig. 6) captured at the Andamans has the marks on the head and body deep brown, whilst the crescentic band on the caudal fin envelopes the whole of it except its outer angles, and instead of its being covered with light spots it has brown undulating vertical bands. The black base to the pectoral is absent.

Habitat.—Red Sea, through the seas of India to the Malay Archipelago. Figure 5 is from a specimen captured in the Malay Archipelago, and for it I am indebted to Dr. Hubrecht, of Leyden. Figure 6 is from the variety I obtained at the Andamans. Both are life-size.

4. Platyglosus Dussumieri, Plate LXXXV, fig. 1.

Labrus, Seba, iii, p. 94, t. 31, fig. 2.
? Labrus nigrescens, Bl. Schn. p. 263.
Labrus sahnee moia, Russell, ii, p. 15, pl. 120.
Julis Dussumieri, Cuv. and Val. xiii, p. 478, pl. 387; Cantor, Catal. p. 236; Jerdon, M. J. L. and Sc. 1851, p. 135.
Julis exornatus, Richards, Ich. China, p. 258.
Julis (Halichœres) notophthalmus, Bleeker, Labr. p. 20.
Julis (Halichœres) mola, Bleeker, En. pisc. Ind. Arch. p. 98.
Halichœres nigrescens, Bleeker, Atlas Ichthyologique, i, 118, t. 37, f. 4.
Halichœres Dussumieri, Günther, Ann. Nat. Hist. 1861, p. 386.
Platyglossus Dussumieri, Günther, Catal. iv, p. 143; Kner, Novara Fische, p. 254.
Platyglossus nigrescens, Day, Fish. Malabar, p. 157.
Kullaray meen, Mal.

B. vi, D. $\frac{9}{12}$, P. 15, V. 1/5, A. $\frac{3}{12}$, C. 15, L. l. 28-29, L. tr. 3/10.

Length of head 4 to $4\frac{1}{4}$, of caudal $6\frac{1}{2}$, height of body 4 to $4\frac{1}{2}$ in the total length. *Eyes*—diameter 5 in length of head, $1\frac{1}{3}$ diameters from end of snout, and 1 apart. *Fins*—dorsal spines slender: first ray of ventral prolonged: caudal rounded. *Colours*—green, with some irregular violet bands between the eyes, and one from them to the snout: two or three pass over the opercles: back bluish, chequered with dull purplish red. A black spot with a light anterior edge at the base of the pectoral. Dorsal and anal greenish, with an oval yellow spot between the base of each ray, and another near their summits, the soft portions with a broad purplish external margin: a blackish ocellus, with a yellow edge, between its fifth and and seventh spines. Caudal with a broad blue transverse band having red spots, its angles being orange with a red base.

Habitat.—East coast of Africa, seas of India, to the Malay Archipelago and beyond.

5. Platyglossus leparensis, Plate LXXXIV, fig. 3.

Julis (Halichœres) leparensis, Bleeker, Banka, iii, p. 730.
Halichœres leparensis, Bleeker, Syn. Labr. p. 287, and Atl. Ich. i, p. 119, t. xlii, f. 5.
Platyglossus leparensis, Günther, Catal. iv, p. 156.

B. vi, D. $\frac{9}{12}$, P. 14, A. $\frac{3}{12}$, C. 15, L. l. 26-28, L. tr. $3\frac{1}{2}$/8.

Length of head 4, of caudal 6, height of body $4\frac{1}{4}$ to $4\frac{1}{2}$ in the total length. *Eyes*—diameter $4\frac{1}{2}$ in the length of head, $1\frac{1}{4}$ diameters from end of snout, and 1 apart. *Fins*—caudal rounded. *Colours*—a broad brown streak from the eye to the snout, and a brown spot behind the orbit, which is continued, but in a lighter shade, to the tail: four narrow curved yellowish lines on the upper portion of the opercle. Body vertically banded. A narrow silvery line from the eye to the caudal fin, and below it four or five more: many of the scales with brown spots, especially those above the lateral-line. Dorsal fin with one or two rows of light round spots: two black ocelli on the dorsal fin, the anterior between the first two spines, and the posterior between the first two or three rays, occasionally a third posterior one, on the upper third of the base of the caudal fin on the free portion of the tail: caudal fin yellowish red.

Habitat.—Andamans to the Malay Archipelago. The one figured is life-size.

6. Platyglossus hortulanus, Plate LXXXV, fig. 3.

Labrus hortulanus, Lacép. iii, p. 516, t. xxix, fig. 2.
Labrus centiquadrus, (Commers.) Lacép. iii, p. 493.
Sparus decussatus, Bennett, Fish. Ceylon, p. 14, pl. xiv.
Halichœres eximius, Rüpp. N. W. Fische, p. 16, t. v, f. 1.
Julis hortulanus, Cuv. and Val. xiii, p. 430; Bleeker, Batav. iv, p. 484.
Julis decussatus, Cuv. and Val. xiii, p. 433.
Ichthycallus decussatus, Swainson, Fishes, ii, p. 232.
Hemitautoga centriquadra, Bleeker, Proc. Zool. Soc. 1861, p. 413, and Atl. Ich. i, p. 130, t. xxxii, f. 3.
Halichœres hortulanus, Günther, Labr. Ann. Nat. Hist. 1861, p. 386.
Platyglossus hortulanus, Günther, Catal. iv, p. 147; Klunz. Verh. z. b. Ges. Wien, 1871, p. 546.
Hembili-girawah, "Basket-parrot," Cingalese.

B. vi, D. $\frac{9}{11\text{-}12}$, P. 15, V. 1/5, A. $\frac{3}{11}$, C. 15, L. l. 28, L. tr. $2\frac{1}{2}$/9, Vert. 10/15.

Length of head $3\frac{3}{4}$ to 4, of caudal $6\frac{1}{2}$ to 7, height of body $3\frac{1}{2}$ in the total length. *Eyes*—diameter 5 in the length of the head, 2 diameters from the end of snout, and $1\frac{1}{2}$ apart. *Fins*—caudal truncated. *Colours*—yellowish-brown: broad bluish oblique bands on the head, and the anterior portion of the back with bluish spots. One (may be two or three) yellow spot on the back below the fourth dorsal spine, and sometimes a black spot behind it. Oblique brown streaks on the dorsal fins, sometimes enclosing spaces: a black axillary spot, usually another at the upper part of the base of the caudal, on which brown spots, or vertical bands, may be present or absent: anal with longitudinal bands. In *young* specimens the dark blotch on the back, just behind the anterior light one, is black: whilst below the last dorsal rays and behind the second white spot on the back, a dark mark is rather well developed.

Habitat.—From the Red Sea and east coast of Africa to the Andamans, Malay Archipelago, and Polynesia. The specimen figured (8·2 inches in length) was from the Andamans.

7. Platyglossus kawarin.

Julis (Halichœres) kawarin, Bleeker, Timor, p. 172.
Halichœres kawarin, Bleeker, Syn. Labr. p. 286, and Atl. Ich. i, p. 121, t. 41, f. 4.
Platyglossus kawarin, Günther, Catal. iv, p. 152.

B. vi, D. $\frac{9}{11}$, P. 14, V. 1/5, A. $\frac{3}{11}$, C. 14, L. l. 28-29.

Length of head $3\frac{1}{2}$ to $3\frac{2}{3}$, of caudal $5\frac{2}{3}$, height of body $3\frac{1}{2}$ in the total length. *Eyes*—diameter $4\frac{1}{2}$ in the length of head, 2 diameters from the end of snout, and 1 apart. *Fins*—caudal slightly rounded. *Colours*—head with a bluish band from the eye to the snout: a second passes from the angle of the mouth along the posterior edge of the orbit to the upper part of the head: a third from the interopercle: a blue blotch on the centre of the opercle, and a wide light-blue band above: some blue spots on the summit of the head. Colours below the lateral-line are blue, each scale having a central rosy spot, forming seven longitudinal bands. Dorsal and anal fins blue, with three rows of round reddish spots, and a black spot on the last dorsal spine and first and second rays: caudal yellowish, with a dark edge.

Habitat.—Andamans to the Malay Archipelago.

8. Platyglossus nebulosus, Plate LXXXV, fig. 2.

Julis nebulosus, Cuv. and Val. xiii, p. 461.
Julis (Halichœres) Reichei, Bleeker, Sumatra, i, p. 43.
Halichœres Reichei, Bleeker, Atl. Ich. i, p. 116, t. 37, f. 1.
Platyglossus nebulosus, Günther, Catal. iv, p. 151; Klunz. Verh. z. b. Ges. Wien, 1871, p. 544.

B. vi, D. $\frac{9}{11}$, P. 14, V. 1/5, A. $\frac{3}{11}$, C. 14, L. l. 28, L. tr. 3/12.

Length of head $3\frac{3}{4}$, of caudal $5\frac{3}{4}$, height of body $3\frac{3}{4}$ in the total length. *Eyes*—diameter 4 in the length of head, $1\frac{1}{2}$ diameters from end of snout, and 1 apart. *Fins*—caudal rounded. *Colours*—olivaceous: several violet bands on the head, one on the cheek being curved, but not completing a circle: the opercular lobe violet: a dark band passing from it to the tail, in its course it gives off several superior and inferior short processes, between which are silvery spots, and there are more along the base of the dorsal fin: some oblique silvery streaks are covered by the pectoral fin. A minute spot sometimes present between the two first dorsal spines, and a larger one between the first two rays: two or three red ocelli margined with blue between the dorsal spines and oblique violet bands ascending forwards: anal with a band along its centre and ocelli at its base: caudal occasionally with black dots.

Habitat.—Red Seas and seas of India to the Malay Archipelago. For the specimen figured, from the Malay Archipelago, I am indebted to Dr. Hubrecht of Leyden.

9. Platyglossus scapularis, Plate LXXXV, fig. 4.

Julis scapularis, Benn. Proc. Zool. Soc. 1831, p. 167.
? *Julis Ceylonensis*, Benn. l. c. 1832, p. 183.
Halichœres cœruleovittatus, Rüpp. N. W. Fische, p. 14, t. iv, f. 1 *(variety)*.
Julis cœruleovittatus, Cuv. and Val. xiii, p. 466; Peters, Monats. Akad. Berlin, 1855, p. 454.
Julis elegans, (Kuhl. and v. Hass.) Cuv. and Val. xiii, p. 467; Kner, Labr. p. 12; Bleeker, Amb. and Ceram, p. 289.
Julis Leschenaultii, Cuv. and Val. xiii, p. 453.
Julis phaiotænia, Bleeker, Banda, p. 322.
Guntheria cœruleovittata, Bleeker, Proc. Zool. Soc. 1861, p. 613, and Versl. Akad. Wet. Amst. xiii, p. 291, and Atl. Ich. i, p. 137, t. 32, f. 2.
Platyglossus scapularis, Günther, Catal. iv, p. 146; Klunz. Verh. z. b. Ges. Wien, 1871, p. 545.
? *Platyglossus Ceylonensis*, Günther, l. c. p. 158.

B. vi, D. $\frac{9}{11}$, P. 15, V. 1/5, A. $\frac{3}{11}$, C. 15, L. l. 27, L. tr. $2\frac{1}{2}$/10.

Length of head $3\frac{1}{4}$ to $4\frac{1}{4}$, of caudal 8, height of body $3\frac{3}{4}$ to 4 in the total length. *Eyes*—diameter $4\frac{1}{2}$ to 5 in the length of head, 2 diameters from end of snout, and $1\frac{1}{4}$ apart. *Fins*—outer ray of ventral elongated: caudal rounded. *Colours*—a broad red blue-edged band passes from the snout to the eye: a second irregular one goes obliquely upwards from the eye to the wide lateral band, which, of a brownish violet colour, passes

from the shoulder to the back of the tail: a red streak extends from the axilla to the abdomen, many of the scales on the body with blue spots: dorsal and anal margined with a green blue-edged band. Caudal with reddish-violet transverse bands.

The colours in *P. Ceylonensis* are given thus: "Yellow, head gray rivulated with yellow: a yellow interrupted band along the lateral-line: another lateral band of the same colour, edged with blue, runs along the side and emits numerous short processes towards the belly: an oblique yellow streak across the base of the pectoral to the belly: vertical fins yellow: a band along the base of the dorsal edged with blue inferiorly: an oblique blue streak behind the base of each dorsal ray, a second behind its middle, and a spot of the same colour behind its top: anal fin with two blue bands: caudal with three irregular transverse rivulated blue bands."

Habitat.—Red Sea, East coast of Africa, seas of India to the Malay Archipelago. The specimen figured is from the Andamans, it is 6·8 inches in length.

10. Platyglossus bimaculatus, Plate LXXXV, fig. 5.

Halichœres bimaculatus, Rüpp. N. W. Fische, p. 17, t. v, f. 2.
Julis bimaculatus, Cuv. and Val. xiii, p. 491.
Platyglossus bimaculatus, Günther, Catal. iv, p. 157; Klunz. Verh. z. b. Ges. Wien, 1871, p. 545.

B. vi, D. $\frac{9}{10}$, P. 13, V. 1/5, A. $\frac{3}{11}$, C. 14, L. l. 27, L. tr. 4/9.

Length of head 4, of caudal 9, height of body 4 in the total length. *Eyes*—diameter 5 in length of head, 2 diameters from end of snout, and $1\frac{1}{2}$ apart. *Fins*—caudal truncated with its outer rays slightly produced. *Colours*—yellowish, greenish round the lower edge of the eye, with violet-coloured bands radiating from it: a broad dark green band passes from the eye to the base of the caudal, and a row of light spots above it. A triangular black spot, edged with white, exists on the ninth or tenth scales of the lateral-line, and is continued downwards in a more diffused form. Upper edge of dorsal fin yellow, having a narrow, purplish, intramargiual line, its lower two-thirds reddish, with two rows of round bluish spots edged with yellow: a dark wide band along the middle of the anal. Caudal vertically rivulated with green, and having a light edge. This species may be variously coloured: the ocelli on the vertical fins becoming bands and *vice versa*.

Habitat.—Red Sea, East coast of Africa, and seas of India. The specimen figured is from Madras, and the only one obtained; it is 8 inches in length.*

Genus, 10—NOVACULA, *Cuv. and Val.*

Xyrichthys, sp. Cuv. and Val.

Branchiostegals six: body oblong, compressed: the head also compressed, having its upper edge sharp or obtuse. Anterior teeth conical: no posterior canine: inferior pharyngeal teeth not confluent or pavement-like. Dorsal fin single with less spines (9) *than rays* (12), *the two first dorsal spines sometimes more or less separated from the others. Scales rather large: head may be entirely scaleless, or the cheeks with two or more rows of small ones, no enlarged row at base of caudal fin. Lateral-line interrupted.*

This Genus haa been sub-divided into the following *sub-genera:*

1. The two first dorsal spines more or less separated from the remainder of the fin.

A. Cheeks without or with merely a few rudimentary scales. *Iniistius*, Gill.
a. Upper edge of the head sharp. *Xirichthys*, Bleeker.
b. Upper edge of the head rather obtuse. *Novaculichthys*, pt. Bleeker.
B. Cheeks scaled. *Hemipteronotus*, Bleeker.

2. No anterior division of the dorsal fin.

C. Cheeks without or with merely a few rudimentary scales. *Xirichthys* et *Malacocentrus*, Gill.
a. Upper edge of the head sharp. *Novacula*, Bleeker.
b. Upper edge of the head rather obtuse. *Novaculichthys*, pt. Bleeker.
D. Cheeks with two or three rows of scales. *Novaculichthys*, pt. Bleeker.
E. Cheeks scaled.

Geographical distribution.—Red Sea, seas of India, and generally into tropical seas and beyond.

SYNOPSIS OF SPECIES.

1. The two first dorsal spines more or less separated from the remainder of the fin.

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*Platyglossus purpureo-lineatus.

Julis purpureo-lineatus, Cuv. and Val. xiii, p. 471.

This species, described from a drawing by Major Finlayson, is thus defined: *Colours*—green, with violet streaks on the back, on the middle of the body and on the borders of the dorsal and anal fins; pectoral yellow: head yellowish, spotted with violet: the caudal with small red streaks: the base of the dorsal spotted with very vivid red.

Habitat.—Siam, ? Ceylon.

A. *Cheeks without or with merely a few rudimentary scales.*

1. *Novacula rufa*, D. 2 | $\frac{7}{12}$, A. $\frac{3}{12}$, L. l. 26. Two rows of minute scales below and behind the eyes. Reddish, caudal with reticulated gray lines. Madras.

B. *Cheeks more or less scaled.*

2. *Novacula pentadactyla*, D. 2 | $\frac{7}{12}$, A. $\frac{3}{12}$, L. l. 28. Eight or nine rows of scales descend from the eye to behind the angle of the mouth. Reddish-brown, with a row of spots behind the eye: a dark spot on side: dorsal and anal fins with oblique blue markings. Bombay to China.

3. *Novacula punctulata*, D. 2 | $\frac{7}{12}$, A. $\frac{3}{12}$, L. l. 27. Eight rows of scales descend from the eye to behind the angle of the mouth. Reddish-brown, no spots behind the eyes: most of the scales with a red base and blue streak: anterior profile blue. Fins with bluish lines. Seas of India to China.

1. Novacula rufa, Plate LXXXV, fig. 6.

? *Xirichthys cyanifrons*, Cuv. and Val. xiv, p. 46; Bleeker, Beng. en Hind. p. 54.
? *Novacula cyanifrons*, Günther, Catal. iv, p. 171.
Novacula rufa, Day, Proc Zool. Soc. 1873, p. 238.

B. vi, D. 2 | $\frac{7}{12}$, P. 14, V. 1/5, A. $\frac{3}{12}$, C. 14, L. l. 26, L. tr. 5/13.

Length of head 2 7, of caudal 1/8, height of body nearly 1/3 of the total length. *Eyes*—high up, above 2 diameters from end of snout: some small scales behind and below the orbit. Body strongly compressed, dorsal profile nearly vertical: upper and anterior edge of head sharp. *Fins*—two first dorsal spines produced, and a deep notch in the interspinous membrane between them and the rest of the fin: spines as long as snout. Outer ventral ray produced, the fin reaches 2/3 of the distance to the base of the anal. *Colours*—rosy, becoming yellowish on the abdomen: the fins yellowish, except the caudal, which has dark grayish reticulated bands.

Specimens from Pondicherry marked *Xirichthys cyanifrons*, which I saw in Paris, appeared to be identical with the species described above, with the exception of longer ventrals: they had a few scales as seen in *rufa*, but some other specimens marked as from Bombay were destitute of these scales. *N. Celebica*, Bleeker, judging from the specimen in the British Museum, appears closely allied to this species.

Habitat.—Seas of India. The specimen figured (life-size) is from Madras.

2. Novacula pentadactyla.

Coryphæna pentadactyla, Linn. Syst. i, p. 446; Bloch, t. 173; Gmel. Linn. p. 1191; Bl. Schn. p. 294.
Hemipteronotus quinque-maculatus, Lacép. iii, p. 215.
Novacula pentadactyla, Cuv. and Val. xiv, p. 69, pl. 395; Richard. Ich. China, p. 261; Bleeker, Bengal en Hind. p. 54, and Celebes, p. 222; Günther, Catal. iv, p. 177.
Novacula sex-maculata, Cuv. and Val. xiv, p. 72.
Hemipteronotus pentadactylus, Bleeker, Labr. p. 294, and Atl. Ich. i, p. 150, t. xxx, f. 4.

B. vi, D. 2 | $\frac{7}{12}$, P. 12, V. 1/5, A. $\frac{3}{12}$, C. 12, L. l. 28.

Length of head 4 to $4\frac{1}{4}$, of caudal $6\frac{1}{2}$ to $6\frac{3}{4}$, height of body $3\frac{2}{3}$ in the total length. *Eyes*—high up, 1/2 a diameter from the dorsal profile, $4\frac{1}{2}$ diameters in length of head, 2 to $2\frac{1}{2}$ diameters from end of snout. Height of head hardly exceeds its length. Profile from snout to forehead nearly vertical. Preorbital in the adult, equals in height about 2 diameters of the eye. *Fins*—the first two dorsal spines remote from the rest, thin, flexible, longer than those in the remainder of the fin, and with the interspinous membrane cleft almost to its base. Outer ventral ray rather elongated. Caudal rounded. *Scales*—8 to 9 rows descending from the eye to behind the angle of the mouth. *Colours*—light reddish-brown, a row of five or six round red spots behind the eye, most of the scales on the body with a red basal spot: a blackish blotch on the side of the body just below the lateral-line above the end of the pectoral fin, and a reddish blotch inferior to the black one. Oblique narrow blue lines on the dorsal fin, two horizontal ones along the anal, and several vertical ones on the caudal.

Habitat.—From Bombay through the Malay Archipelago to China. A specimen from Bombay exists in the Paris Museum.

3. Novacula punctulata, Plate LXXXVIII, fig. 2.

Cuv. and Val. xiv, p. 73; Günther, Catal. iv, p. 177 (? Bleeker, *N. pentadactyla*, Labr. p. 22).
Xyrichthys cyanifrons, Jerdon, M. J. L. and Sc. 1851, p. 135 (not Cuv. and Val.).

B. vi, D. 2 | $\frac{7}{12}$, P. 11, V. 1/5, A. $\frac{3}{12}$, C. 14, L. l. 27, L. tr. 4/13.

Length of head $4\frac{2}{3}$, of caudal $6\frac{1}{3}$, height of body $4\frac{1}{4}$ in the total length. *Eyes*—high up, about 3 diameters from the end of snout. Profile from snout to forehead very abrupt. Height of head exceeds its length by one-third. *Fins*—two first dorsal spines separated by a cleft from the remainder of the fin: ventral reaches the anal when laid flat. Caudal rounded. *Scales*—cheeks covered with about 8 rows. *Colours*—brownish, with a dark spot on the side above the end of the pectoral fin, most of the scales on the body with a blue spot or streak, and reddish base: anterior profile bluish: fins orange, two blue bands along the dorsal, and three along the anal fins, also numerous oblique grayish bands: vertical blue bands on the caudal.

The specimen is from Sir W. Elliot's collection, it was captured at Madras, April, 1852. The water-colour drawing of it is termed as above by Jerdon. Its native name is given as *Chilacka-sani-muyya*, Tamil.

In Cuv. and Val. the fins are said to be destitute of marks, but I think there can be little doubt that the species are identical.

Habitat.—Seas of India to China.

Genus, 11—JULIS, sp. *Cuv. and Val.*

Branchiostegals six: body oblong and compressed: snout not produced. Anterior teeth conical: no posterior canine tooth; inferior pharyngeal teeth not confluent or pavement-like. A single dorsal fin with less spines (8) *than rays* (11-14) *: anal with two or three spines and about the same number of rays as the soft dorsal* (11-14). *Scales large: none on the head: no enlarged row at the base of the caudal fin. Lateral-line continuous.*

Geographical distribution.—Red Sea, seas of India, tropical and adjacent seas.

SYNOPSIS OF SPECIES.

1. *Julis dorsalis*, D. $\frac{8}{13}$, A. $\frac{3}{11}$, L. l. 26-29. Broad red bands radiate from the eye: six vertical black cross bars along the back, and a black spot at base of pectoral fin. A red band along the side. East coast of Africa, seas of India to the Malay Archipelago.
2. *Julis lunaris*, D. $\frac{8}{13}$, A. $\frac{2}{11}$, L. l. 28. Oblique red bands on head, body green, each scale with a vertical red streak. Red Sea, seas of India to Malay Archipelago.
3. *Julis amblycephalus*, D. $\frac{8}{13}$, A. $\frac{2-3}{11}$, L. l. 27. Blue dark-edged lines across the cheeks, a dark triangular spot at base of pectoral. Ceylon to the Malay Archipelago.
4. *Julis Hebraica*, D. $\frac{8}{13}$, A. $\frac{2}{11}$, L. l. 27-28. Greenish, scales with a dark vertical mark. Violet bands pass from the eye, and a buff dark-edged cross-band goes from two first dorsal spines to the ventral fin: a dark spot between first and third dorsal spines. Red Sea, seas of India, and beyond.
5. *Julis purpurea*, D. $\frac{8}{13}$, A. $\frac{3}{11}$, L. l. 27-28. Colours vary, usually green or blue, with or without red bands radiating from the eye. Two or three red or violet bands along the side, sometimes joined by cross bands of the same colour. Red Sea, seas of India, to the Malay Archipelago and beyond.
6. *Julis Janseni*, D. $\frac{8}{13}$, A. $\frac{2}{11}$, L. l. 28. Yellow, with from three to five vertical black bands: a black spot on first two anal rays. Andamans to the Malay Archipelago and beyond.

1. **Julis dorsalis**, Plate LXXXV, fig. 7.

Sparus Hardwickii, Bennett, Fish. Ceylon, p. 12, pl. xii (not *Julis Hardwickii*, Gray).

Julis dorsalis, Quoy and Gaim. Voy. Astrol. Zool. iii, Poiss. p. 713, pl. xv, f. 5; Cuv. and Val. xiii, p. 449; Richard. Ich. China, p. 259; Bleeker, Beng. en Hind. p. 52, and Amboina, iii, p. 564, and Atl. Ich. i, p. 94, t. 34, f. 4; Peters, Monats. Ak. Berlin, 1855, p. 454; Günther, Ann. Nat. Hist. 1861, p. 387, and Catal. iv, p. 190.

Julis semifasciatus, Cuv. and Val. xiii, p. 448.

Clorichthys Hardwickii, Swainson, Fishes, ii, p. 232.

Julis urostigma, Bleeker, Sumatra, ii, p. 287 (young).

Mal-girawah, "Flower-parrot," Cingalese.

B. vi, D. $\frac{8}{13}$, P. 14, V. 1/5, A. $\frac{3}{11}$, C. 15, L. l. 26-29, L. tr. 3/11.

Length of head $3\frac{2}{3}$, of caudal $5\frac{1}{2}$, height of body $3\frac{2}{3}$ in the total length. *Eyes*—diameter $4\frac{1}{2}$ to 5 in the length of head, $1\frac{1}{2}$ to 2 diameters from end of snout, and $1\frac{1}{4}$ to $1\frac{1}{2}$ apart. *Fins*—caudal lobes somewhat produced. *Colours*—greenish, becoming silvery along the abdomen. Broad red bands radiate from the eyes: six vertical black cross bars along the back, extended on to the middle of the body: a black spot in the axilla: a red band along the side to the tail: usually a black, or a very dark blue band on the dorsal fin, the anal with a black spot anteriorly: caudal with a grayish semilunar band in its last half.

Habitat.—East coast of Africa, seas of India, to the Malay Archipelago and beyond. The specimen figured (life-size) is from the Moluccas, and I am indebted for it to Dr. Hubrecht, of Leyden.

2. **Julis lunaris**, Plate LXXXVI, fig. 1.

Labrus lunaris, Linn. Syst. Nat. i, p. 474, Gmel. Linn. p. 1284; Bl. Schn. p. 242; Lacép. iii, pp. 427, 467; Gronov. ed. Gray, p. 82.

Scarus gallus, Forsk. Desc. Anim. p. 26.

Labrus zeylanicus, (Forst.) Penn. Ind. Zool. p. 56, pl. xvi; Gmel. Linn. p. 1287; Bl. Schn. p. 246; Lacép. iii, pp. 427, 472.

Labrus viridis, Bl. v, p. 129, t. 282; Bl. Schn. p. 243; Lacép. iii, p. 454.

Labrus gallus, Linn. Gmel. p. 1284; Bl. Schn. p. 245.

Osphromenus gallus, Lacép. iii, p. 122.

Julis Hardwickii, Gray and Hardwicke, Ind. Zool. Fish, t. ix, f. 1.

Julis porphyrocephala, Benn. Proc. Zool. Soc. ii, 1832, p. 183.

Julis lunaris, Cuv. and Val. xiii, p. 409; Jerdon, M. J. L. and Sc. 1851, p. 135; Bleeker, Beng. en Hind. p. 52, Labr. p. 6, and Atl. Ich. i, p. 90, t. 33, f. 5; Günther, Catal. iv, p. 180; Kner, Novara Fische, p. 256; Klunz. Verh. z. b. Ges. Wien, 1871, p. 535.

Julis meniscus et *Mertensii*, Cuv. and Val. xiii, pp. 415, 421.
Julis trimaculatus, Rüpp. N. W. Fische, p. 13, *young* (not Quoy and Gaim.).
Chloriichthys lunaris and *Hardwickii*, Swainson, Fishes, ii, p. 232.
Julis Celebicus, Bleeker, Celebes, viii, p. 313 *(young)*.
Julis lutescens (Soland.) Zool. Beech. Voy. Fishes, p. 65, pl. xix, f. 2.

B. vi, D. $\frac{8}{13}$, P. 14, V. 1/5, A. $\frac{2}{11}$, C. 14, L. l. 28, L. tr. $2\frac{1}{2}/10$.

Length of head $4\frac{1}{4}$ to $4\frac{1}{2}$, of caudal $4\frac{1}{2}$ to $5\frac{1}{2}$, height of body 4 to $4\frac{1}{2}$ in the total length. *Eyes*—diameter 5 in the length of head, $1\frac{2}{3}$ diameters from the end of snout, and 1 apart. *Fins*—caudal deeply lunated in the adult. *Colours*—head violet, with several oblique reddish bands: body green, each scale with a vertical red streak, forming bands: an oblong reddish-violet spot on the pectoral. Dorsal red, with a blue and yellow margin: anal violet, with a yellow edge: caudal yellow, its base and lobes green. The *young* have a black spot at the base of the second to the fourth dorsal rays, and some light blotches along the back, also a black spot at the root of the caudal fin.

Habitat.—Red Sea, east coast of Africa, to the Malay Archipelago and beyond. The specimen figured (life-size) is from the Andamans.

3. Julis amblycephalus.

Bleeker, Malang, p. 83, and Atl. Ich. i, p. 90, t. xxxiii, f. 6; Günther, Catal. iv, p. 182.

B. vi, D. $\frac{8}{13}$, P. 14, V. 1/5, A. $\frac{2-3}{11}$, C. 14, L. l. 27, L. tr. 2/9.

Length of head $4\frac{1}{3}$ to 5, of caudal 6, height of body 5 to $5\frac{1}{3}$ in the total length. *Eyes*—diameter 3 to $3\frac{1}{3}$ in length of head, $1\frac{1}{2}$ diameters from end of snout, and 1 to $1\frac{1}{4}$ apart. *Fins*—outer caudal rays produced. *Colours*—the upper two-thirds of the head and body olive brown, each scale having a vertical streak: the lower third of the body white: a narrow blue dark-edged line passes from the lower angle of the orbit to the axilla: a second across the angle of the preopercle: a broad triangular spot exists in the axil of the pectoral, which fin is yellow with a blackish extremity. Dorsal fin dark anteriorly, becoming a little lighter posteriorly, the soft portion having a narrow white edge: caudal lobes dark olive.

Habitat.—Ceylon to the Malay Archipelago.

4. Julis Hebraica, Plate LXXXVI, fig. 2.

Labrus Hebraicus, Lacép. iii, pp. 455, 526, plate 29, f. 3.
? Labrus argentatus, var. Lacép. iii, pl. 18, f. 1.
Julis cingulata, Quoy and Gaim. Voy. Astrol. p. 711, pl. 15, f. 3.
Julis genivittatus, Cuv. and Val. xiii, p. 416; Günther, Catal. iv, pp. 183, 508.
Julis Hebraicus, Cuv. and Val. xiii, p. 423; Günther, Catal. iv, p. 186.

B. vi, D. $\frac{8}{13}$, P. 14, V. 1/5, A. $\frac{2}{11}$, C. 15, L. l. 27-28, L. tr. 2/9.

Length of head 4 to $4\frac{1}{4}$, of caudal 5 to 6, height of body 4 to $4\frac{1}{2}$ in the total length. *Eyes*—diameter 5 to $5\frac{1}{2}$ in the length of head, $1\frac{1}{4}$ to $1\frac{1}{2}$ diameters from end of snout, and 1 apart. *Fins*—caudal lobes produced in the adult. *Colours*—in the *young (J. hebraica)* greenish, each scale having a vertical dark mark. A wide violet dark-edged band passes from the eye downwards, a second backwards to the base of the pectoral, and a third from the upper edge of the eye to the occiput. A buff-coloured cross band edged with dark passes from the two first dorsal spines to behind the ventral fin. Dorsal fin with a dark ocellus between its first and third spines: a semilunar vertical band on the middle of the caudal fin. In the adult *(J. genivittata)* the bands on the head and spots on the scales are apparent, but there is no light cross band. The pectoral has a dark spot, the colour being most intense at the edge of the fin.

Habitat.—Red Sea, east coast of Africa, seas of India and beyond. The specimen figured (life-size) is from the Andaman islands.

5. Julis purpurea, Plate LXXXVI, fig. 3.

Scarus purpurea, Forsk. Desc. Anim. p. 27.
Labrus purpureus, Linn. Gmel. i, p. 1284.
Grammistes purpureus, Bl. Schn. p. 190.
Labrus trilobatus, Lacép. iii, pp. 454, 526 (not Shaw).
Labrus fuscus, Lacép. iii, p. 437.
Julis purpureus, Rüpp. Atl. Fische, p. 25, t. vi. f. 2 (not synon.); Cuv. and Val. xiii, p. 445 (not synon.); Günther, Catal. iv, p. 189 (not synon.); Klunz. Verh. z. b. Ges. Wien, 1871, p. 97.
Julis semicæruleus, Rüpp. N. W. Fische, p. 10, pl. iii. fig. 1; Cuv. and Val. xiii, p. 442.
Julis umbrostygma, Rüpp. N. W. Fische, p. 11, t. iii. f. 2; Bleeker, Atl. Ich. i, p. 92, t. xxxiv, f. 2; Günther, Syn. Labr. An. Nat. Hist. 1861, p. 387, and Catal. iv, p. 185; Kner, Novara Fische, p. 257.
Julis bicatenatus, Benn. Proc. Zool. Soc. 1831, p. 167.
Julis quadricolor, Less. Voy. Coq. Zool. ii, p. 139, pl. 35, f. 1; Cuv. and Val. xiii, p. 443; Bleeker, Java, p. 339, and Manad. p. 55, and Atl. Ich. i, p. 93, t. 34, f. 4.
Scarus Georgii, Benn. Fish. Ceylon, p. 24, pl. xxiv.

Julis trilobatus, Cuv. and Val. xiii, p. 437; Günther, Catal. iv, p. 187.

Julis Souleyetii, Cuv. and Val. xiii, p. 457; Eyd and Soul. Voy. Bonite, Zool. i, p. 190, Poiss. t. vi, f. 2; Bleeker, Kokos, iii, p. 176.

Julis formosus, *æruginosus*, *cyanogaster*, and *erythrogaster*, Cuv. and Val. xiii, pp. 439, 441, 444, 447.

? *Julis abhortani*, Cuv. and Val. xiii, p. 450; Günther, Catal. iv, p. 185.

Scarus (?) quinquevittatus, Richardson, Voy. Blossom, Zool. p. 66, pl. 19, f. 3.

Julis guentheri, Bleeker, Versl. Akad. Wet. Amst. xiii, p. 279, and Atl. Ich. i, p. 94, t. 34, t. 1; Günther, Catal. iv, p. 189, and in Brenchley's Cruise of Curaçoa, p. 426, pl. 32, f. A.

Lena-girawah. "Squirrel-parrot," Cingalese.

B. vi, D. $\frac{8}{13}$, P. 16, V. 1/5, A. $\frac{3}{11}$, C. 14, L. l. 27-28, L. tr. 3-$3\frac{1}{2}$/10.

Length of head $3\frac{3}{4}$, of caudal 7, height of body $3\frac{3}{4}$ to $4\frac{1}{4}$ in the total length. *Eyes*—diameter 5 to $6\frac{1}{2}$ in the length of head, $1\frac{1}{2}$ to $2\frac{1}{2}$ diameters from the end of snout, and $1\frac{3}{4}$ to 2 apart. *Teeth*—no posterior canine. *Fins*—caudal lobes produced in the adult. *Colours*—green or blue, with or without irregular pinkish or red bands radiating from the eye: a red or pink band which often gives off short ones superiorly, passes from the opercle to the caudal fin: a second of a brownish-violet colour goes along the back to the upper margin of the caudal fin: and a third along the abdomen to the lower margin of the caudal; whilst sometimes there is a fourth from the chest to the end of the base of the anal: the rays of the caudal fin are green and the membrane red and violet. Dorsal fin green or yellow with a broad pink blue-edged band along its middle, and sometimes having a black spot anteriorly: anal green, with a dark basal band; the posterior half of the pectoral blackish. In the variety *umbrostygma* the *colours* are greenish, becoming of a dull white along the lower third of the body. Head with black lines and scattered spots. Two reddish lines along the side of the body which send up vertical processes joining each other. Occiput and body with small vertical brown spots, either in the form of bands or else scattered. Dorsal fin with a black spot between its first and third spines, a sea-green basal band, another in its upper third and the two separated by round reddish spots: anal similarly marked. Caudal with green streaks between the rays. Outer third of the pectoral stained gray. The dorsal and anal fins are occasionally differently coloured, they may have a single green band along their centres: or a red band having yellow marks above and below, with a brown blue-edged intramarginal band.

Habitat—Red Sea, East coast of Africa, seas of India to the Malay Archipelago, China, and beyond. The specimen figured is 10 inches in length and from the Andamans, the whole of its back above the upper light band is cœrulean blue. Amongst Sir W. Elliot's drawings is one of this fish, captured at Waltair, and termed "*Chilatrasani*, Tel."

6. Julis Jansenii, Plate LXXXVI, fig. 4.

Bleeker, Manado, p. 56, and Atl. Ich. i, p. 91, t. 34, f. 5; Günther, Catal. iv, p. 187.

B. vi, D. $\frac{8}{13}$, P. 15, V. 1/5, A. $\frac{2}{11}$, C. 14, L. l, 28, L. tr. 2/9.

Length of head 4 to $4\frac{1}{2}$, of caudal $5\frac{1}{2}$, height of body $4\frac{1}{3}$ to $4\frac{2}{3}$ in the total length. *Eyes*—diameter 6 in length of head, $2\frac{1}{4}$ diameters from end of snout, and $1\frac{1}{3}$ apart. *Fins*—caudal rounded in the young, lobes produced in the adult. *Colours*—yellow, with from three to five wide black vertical bands going from the back down the sides. In the specimen figured (from the Andamans) the black colour almost hides the yellow ground colour, and both are continued upwards on to the dorsal fin. A violet streak from behind the opercle on to the base of the pectoral fin. Pectoral, ventral, and anal yellowish, the last with a black spot at the outer end of its last two rays.

In the figure in Bleeker's Atlas, there are only three black cross bands on the body, the anterior going over the head and nape to the base of the pectoral: the second from the fourth to sixth dorsal spines to half way down the sides: the third from the summit of all the dorsal rays decreasing in width as it descends to the base of the last few anal rays, where it expands so as to cover the outer edge of all.

Habitat.—Andamans to the Malay Archipelago and beyond.

Genus, 12—Gomphosus, *Lacépède*.

Branchiostegals six. Body oblong, compressed. Snout produced, tubiform: the opening of the mouth not extending nearly so far backwards as the eyes: preopercle entire. Gill membranes attached to the isthmus. Anterior teeth conical: no posterior canine: inferior pharyngeal teeth not confluent or pavement-like. A single dorsal fin with less spines (8 or 9) than rays (13). *Anal with two or three spines and less rays* (11) *than the soft dorsal. Scales rather large, none on the head: no enlarged row at base of caudal fin, but the base of the dorsal and anal scaly. Lateral-line continuous.*

Geographical distribution.—Red Sea, East coast of Africa, seas of India to the Malay Archipelago and beyond.

SYNOPSIS OF SPECIES.

1. *Gomphosus cœruleus*, D. $\frac{8}{13}$, A. $\frac{2-3}{11}$, L. l. 29. Violet with the vertical fins yellow: or vivid green. Seas of India to the Malay Archipelago.

2. *Gomphosus pectoralis*, D. $\frac{8}{13}$, A. $\frac{2-3}{11}$, L. l. 26. Brownish, each scale with a dark base: caudal with a white posterior edge. Seas of India to the Malay Archipelago.

3. *Gomphosus tricolor*, D. $\frac{8}{13}$, A. $\frac{2-3}{11}$, L. l. 29. Greenish or brownish, with a wide yellow band on the shoulder to behind the pectoral: pectoral with a bluish vertical band. Ceylon, seas of India to the western Pacific.

1. Gomphosus cæruleus, Plate LXXXVIII, fig. 3.

Acarauna longirostris, Sevastianof, in Nov. Act. Petrop. xiii, p. 357, t. xi.

Gomphosus cæruleus, Lacép. iii, p. 101, t. v, f. 1, and t. vi, f. 1.; Cuv. and Val. xiv, p. 29; Cuv. Règ. Anim. Ill. Poiss. pl. 89, f. 2; Bleeker, Beng. en Hind. p. 54, Sumatra, ii, p. 292, and Atl. Ich. i, p. 86, t. xxi, f. 5; Günther, Catal. iv, p. 192; Klunz. Verh. z. b. Ges. Wien, 1871, p. 534.

Gomphosus ornatus, Benn. Life of Sir S. Raffles, p. 690.

Gomphosus viridis, Benn. Fish. Ceylon, p. 30, pl. xxx; Swainson, Fishes, ii, p. 231.

Nil-talapat-girawah, Cingalese.

B. vi, D. $\frac{8}{13}$, P. 15, V. 1/5, A. $\frac{2-3}{11}$, C. 14, L. l. 29, L. tr. 3/10.

Length of head 3, of caudal $5\frac{2}{3}$, height of body $4\frac{1}{2}$ to 5 in the total length. *Eyes*—situated rather behind the middle of the length of the head. *Teeth*—the two anterior in the upper jaw curved and much longer than the remainder. *Fins*—spinous much lower than the rayed portion of the dorsal fin. Caudal with its outer rays much produced in the adult. *Colours*—sometimes violet with the vertical fins yellow, the dorsal and anal with blue edges: the upper and lower margins of the caudal blue; or else of a vivid green, with the outer edges of the dorsal and anal lighter, as are also the posterior extremity of the caudal and the inner rays of the ventral.

Habitat.—Seas of India to the Malay Archipelago. The specimen figured is $9\frac{1}{2}$ inches in length, and from Ceylon.

2. Gomphosus pectoralis, Plate LXXXVI, fig. 6.

? *Gomphosus varius*, Lacép. iii, p. 104, pl. 5, f. 2; Günther, Catal. iv, p. 193.

Gomphosus pectoralis, Quoy and Gaim, Voy. Uranie, Zool. p. 282.

Gomphosus fuscus, Bennett, Fish. Ceylon, p. 3, pl. iii; Cuv. and Val. xiv, p. 25; Bleeker, Beng. en Hind. p. 54; Swainson, Fishes, ii, p. 231.

Gomphosus melanotus, Bleeker, Kokos, p. 457, and Atl. Ich. i, p. 87, t. 21, f. 3; Günther, Catal. iv, p. 193; Day, Fish. Andam. Proc. Zool. Soc. 1870, p. 698; Klunz. Verh. z. b. Ges. Wien, 1871, p. 535.

Koppara girawah, Cingalese.

B. vi, D. $\frac{8}{13}$, P. 15, V. 1/5, A. $\frac{2-3}{11}$, C. 14, L. l. 26, L. tr. 2/11.

Length of head $2\frac{3}{4}$ to 3, of caudal 8, height of body $4\frac{1}{2}$ to $4\frac{2}{3}$ in the total length. *Eyes*—diameter 6 to $6\frac{1}{2}$ in the length of head, 3 diameters from end of snout, and 1 apart. *Fins*—caudal rounded or truncated in the young, having the outer rays slightly produced in the adult. *Colours*—upper part of head and back reddish brown, becoming lighter on the abdomen: each scale darkest at its base: cheeks pinkish. A dark band from the snout through the eye. Pectorals yellow: vertical fins dark-coloured, becoming deep brown externally, having a very narrow light edge: caudal the same, with a black margin and a rather wider white border: ventrals whitish, the outer ray brown. A row of round transparent spots along the base of the anal fin.

The fish figured is identical with the type of *G. fuscus*, C. and V. (L. l. 26), the type specimen of which is in Paris in a good state of preservation. On the bottle is also marked "*G. Commersonii*, Q. and G." On referring to Voy. Uranie, p. 282, we find "*Gomphose Commerson—Gomphosus pectoralis.*" The figure of *G. varius*, Lacépède, agrees fairly well with this species.

Habitat.—Mauritius, Ceylon, Andamans, to the Malay Archipelago. The one figured (life-size) is from the Andamans. My largest specimen is 6·7 inches in length.

3. Gomphosus tricolor.

Quoy and Gaim. Voy. Uranie, p. 280, and *Gomphose Lacépède*, pl. 55, f. 2; Bleeker, Manad. and Makass. p. 54, and Atl. Ich. i, p. 85, t. xxi, f. 6; Günther, Catal. iv, p. 193.

Gomphosus Cepedianus, Cuv. and Val. xiv, p. 18, pl. 390.

B. vi, D. $\frac{8}{13}$, P. 16, V. 1/5, A. $\frac{2-3}{11}$, C. 14, L. l. 28-29, L. tr. 3/9, Vert. 9/15.

Length of head $3\frac{3}{4}$, of caudal $7\frac{1}{2}$ to 8, height of body $4\frac{1}{4}$ in the total length. *Eyes*—rather high up, and situated midway between the angle of the mouth and the end of the opercle. *Fins*—caudal with its outer rays rather produced. *Colours*—brownish or greenish, with a broad yellow band from the shoulder to behind the base of the pectoral fin. Vertical fins yellow: pectoral brownish, with a dark spot at its base, and a narrow vertical bluish band parallel with its posterior border.

Habitat.—Ceylon, through the seas of India to the Western Pacific.

Genus, 13—Cheilio, *(Commerson) Lacépède.*

Branchiostegals six: body elongated and nearly cylindrical. Snout somewhat produced: preopercle serrated in the young. Profile to dorsal fin not elevated. Teeth in a single row, the posterior ones in the lower jaw being

compressed and small: no posterior canine. Dorsal spines flexible, less (9) *in number than the rays* (13-14)*: anal with 3 (or 2) spines and less rays* (11-12) *than the dorsal. Scales of medium size: head scaleless, except a row of rudimentary ones on the opercle: no enlarged row at base of caudal fin. Lateral-line continuous.*

Geographical distribution.—Red Sea, east coast of Africa, seas of India to the Malay Archipelago and beyond.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Cheilio inermis*, D. $\frac{9}{13-14}$, A. $\frac{3}{12}$, L. l. 45-50. Brownish, divided by a brown band from a silvery abdomen. Red Sea, seas of India to the Malay Archipelago and beyond.

1. Cheilio inermis, Plate LXXXVIII, fig. 4.

Labrus inermis, Forsk. p. 34; Bl. Schn. p. 262.

Labrus hassek, (Bonn.) Lacép. iii, p. 513.

Cheilio auratus, (Comm.) Lacép. iv, p. 433; Quoy and Gaim. Voy. Uranie, Zool. p. 274, pl. 54, f. 2; Cuv. and Val. xiii, p. 341; Bleeker, Celebes, ii, p. 221; Peters, Seefische Mosamb. Pruss. Ak. Wiss. 1855, p. 453.

Cheilio fuscus, (Comm.) Lacép. iv, p. 433; Cuv. and Val. xiii, p. 349.

Labrus fusiformis, Rüpp. N. W. Fische, p. 7, t. i, f. 4.

Cheilio cyanochloris, Forskalii, and *viridis*, Cuv. and Val. xiii, pp. 346, 349, 352.

Cheilio hemichrysos, Cuv. and Val. xiii, p. 351; Bleeker, Banda, ii, p. 255.

Eupemis fusiformis, Swainson, Fishes, ii, p. 232.

Hemiulis auratus, Swainson, Fishes, ii, p. 228.

Cheilio ramosus, Jenyns, Voy. Beagle, Fishes, p. 102.

Cheilio bicolor, Bianc. Spec. Zool. Mosamb. 1859, p. 254, t. v.

Cheilio inermis, Bleeker, Atl. Ich. i, p. 82, t. xxxi, f. 4; Günther, Catal. iv, p. 194; Klunz. Verh. z. b. Ges. Wien, 1871, p. 531.

B. vi, D. $\frac{9}{13-14}$, P. 12, V. 1/5, A. $\frac{3}{12}$, C. 13, L. l. 45-50, L. tr. 3/17.

Length of head $3\frac{1}{2}$, of caudal $7\frac{1}{2}$, height of body 9 to 10 in the total length. *Eyes*—diameter 6 in the length of head, $2\frac{2}{3}$ diameters from the end of snout, and 1 apart. The height of the head equals its postorbital length. *Fins*—caudal rounded. *Colours*—brownish superiorly, divided by a darker band (passing from below the eye to the middle of the tail) from a silvery white lower surface: there are some black spots along this lateral band. Irregular blue streaks on the head and anal fin, two or three rows of blue spots on the dorsal. In some the lateral band ceases at the opercles, or is entirely absent. The scales on the body may have blue or brown centres, or dark edges.

Habitat.—Red Sea, east coast of Africa, seas of India to the Malay Archipelago and beyond. The specimen figured (life-size) is from the Malay Archipelago, and for it I am indebted to Dr. Hubrecht, of Leyden.

Genus, 14—Coris, *Lacépède.*

Hologymnosus et *Labrus*, sp. Lacép.: *Halichœres*, sp. Rüppell: *Julis*, sp. Cuv. and Val.: *Pseudocoris, Hemicoris et Ophthalmolepis*, Bleeker.

Branchiostegals six: body oblong, compressed. Anterior teeth conical: a posterior canine may be present: inferior pharyngeal teeth not confluent or pavement-like. A single dorsal fin with less spines (9) *than rays* (11-12)*: anal with three spines, and about the same number of rays* (11-13) *as the soft dorsal. Scales rather small, none on the head (except in C. lineolata): no enlarged row at base of caudal fin. Lateral-line continuous.*

Geographical distribution.—Fishes belonging to this Genus have a very wide range: not only do they exist in the Red Sea, throughout the seas of India to Australia and Polynesia, but they are likewise found in the Mediterranean and adjacent parts of the Atlantic.

As in other Labroid fishes the colours of those belonging to the genus appear to be subject to considerable differences, this seems to be sometimes due to sex; thus Steindachner has observed that *Coris julis* is the male of *C. giofredi.*

SYNOPSIS OF SPECIES.

1. *Coris formosa*, D. $\frac{9}{12}$, A. $\frac{3}{12}$, L. l. 74-84. Gray, with blue spots. Blue bands on head: dorsal and anal lineated or spotted with blue. East coast of Africa, seas of India to the Malay Archipelago and beyond.

2. *Coris aygula*, D. $\frac{9}{12}$, A. $\frac{3}{12}$, L. l. 60. Brown or green, with blue spots on head and bands across neck: a dark axillary spot: a pale cross band behind pectoral, and red blotches on back of tail.

1. Coris formosa, Plate LXXXVI, fig. 5.

Labrus formosus, Benn. Fish. Ceylon, p. 16, pl. 16.

Julis formosus, Swainson, Fishes, ii, p. 233 (c. fig. from Bennett); Bleeker, Beng. en Hind. p. 54, and Celebes, iv, p. 169.

Coris formosa, Bleeker, Atl. Ich. i, p. 99, t. xix, f. 3; Günther, Catal. iv, p. 200, and Fish. Zanz. p. 100.

Coris pulcherrima, Gunther, Catal. iv, p. 200.
Rattoo-girawah, Cingalese.

B. vi, D. $\frac{9}{12}$, P. 14, V. 1/5, A. $\frac{3}{12}$, C. 14, L. l. 74-84, L. tr. 8/35.

Length of head $4\frac{3}{4}$, of caudal $7\frac{1}{2}$, height of body 4 to $4\frac{1}{4}$ in the total length. *Eyes*—diameter 6 in the length of head, 2 diameters from the end of snout, and $1\frac{1}{3}$ apart. *Teeth*—a posterior canine at the angle of the mouth, said to be absent in young specimens. *Fins*—first spine of the dorsal fin elongated, and having a fine termination, the second a little longer than the remaining ones. Caudal rounded. *Colours*—Bennett describes them as bluish-gray with circular black spots: head yellow, with two oblique blue bands ascending towards the origin of the dorsal, one commencing from the snout and passing through the eye, the other parallel to the first, running below the eye. Dorsal and anal fins brown, the former with a red margin and with two green lines running within the red: black dots between the rays. Anal with a narrow green edge, and a narrow green intermarginal line; a series of green dots within the margin. The inner half of the caudal red, the outer yellowish white. Or the lines on the head may be violet and rather oblique: one ascends from the eye to the dorsal fin: body brownish-violet, covered posteriorly with scattered blue spots becoming disposed more in horizontal rows aloug the side of the free portion of the tail. Fins yellowish, dorsal and anal having a blue outer edge, and a blue black-edged intramarginal band. blue spots along the bases of the fins. With or without a reddish vertical band on the middle third of the caudal fin.

Dr. Günther considers Swainson's (=Bleeker's) species as distinct from Bennett's, but he merely reproduces Bennett's plate on a smaller scale. Colours alone do not appear sufficient in members of this family on which to found species; experience as has been observed, "must lead us to suppose that many a tropical species introduced into our system will prove to be merely a variety." (Günther, Catal. iv, p. 508). Dr. Günther further observes (Fish. Zanzibar, p. 100), "This species has been observed by Col. Playfair at Zanzibar for the first time since its discovery by Bennett. The specimen agrees as well with Bennett's figure as if the latter had been taken from the former; and Dr. Günther's opinion as to the distinctness of *C. formosa*, Bleeker, and *C. formosa*, Bennett, is fully confirmed."

Habitat.—East coast of Africa, Ceylon to the Malay Archipelago and beyond. I am indebted for the specimen figured to Dr. Hubrecht, of Leyden, it came from the Malay Archipelago.

2. **Coris aygula**, Plate LXXXVIII, fig. 5.

Lacép. iii, pp. 96, 97, t. iv, f. 1: Günther, Catal. iv, p. 201; Klunz, Verh. z. b. Ges. Wien, 1871, p. 539.
Coris angulatus, Lacép. l. c. f. 2.
Labrus cingulum, (Commerson) Lacép. iii, p. 517, pl. 28, f. 1.
Julis aygula, Rüpp. Atl. Fische, p. 25, t. vi, f. 3.
Julis semipunctatus, Rupp. N. W. Fische, p. 12, t. iii, f. 3.
Labrus aureo-maculatus, Bennett, Fish. Ceylon, p. 20, pl. xx.
Julis Ruppellii, Bennett, Proc. Zool. Soc. 1831, p. 128.
Julis cingulum, Cuv. and Val. xiii, p. 428; Bleeker, Beng. en Hind. p. 52.
Julis gibbifrons, Quoy and Gaim. Voy. Astrol. Poiss. p. 707, t. xix, f. 3.
Julis coris, Cuv. and Val. xiii, p. 491.
Chlorichthys aygula, Swainson, Fishes, ii, p. 232.
Coris cingulum, Günther, Catal. iv, p. 203; Klunz. Verh. z. b. Ges. Wien, 1871, p. 539.

Tik-girawah, Cingalese.

B. vi, D. $\frac{9}{12}$, P. 14, V. 1/5, A. $\frac{3}{12}$, C. 15, L. l. 60, L. tr. 6/28.

Length of head $3\frac{3}{4}$ to 4, of caudal $7\frac{1}{2}$, height of body $3\frac{3}{4}$ to 4 in the total length. *Eyes*—small in the adult, a prominent knob on the dorsal profile above them. Upper lip broad, with folds, and not continuous with the lower one which is pendant. *Teeth*—a posterior canine if present small and mostly concealed. *Fins*—anterior dorsal spines elevated in the adult: ventrals elongated: caudal rounded. *Colours*—the immature have the head and anterior part of the body olive brown, occasionally with two brown blotches, also small blue spots over the head, and a black spot on the opercle: a black axillary spot, a pale cross band opposite the end of the pectoral, behind which the colours are buff, sometimes with red or brown blotches on the back and free portion of the tail. Vertical fins brown with black spots and white edges, or with a wide yellow margin. The *adult* darkish or deep green, occasionally two or three red angular bands across the neck: the edges of the preopercle sometimes red, a blue mark on the extremity of the opercle. Sometimes a light vertical band on the body from the last two dorsal spines to the vent. Vertical fins greenish, with a red intermarginal band, and sometimes oblique red blotches along the base.

Habitat.—Red Sea, seas of India, New Hebrides.

Genus, 15—Cymolutes, *Günther.*

Xyrichthys, sp. Cuv. and Val.

Branchiostegals six: body oblong, compressed. Snout rather elevated. Anterior teeth free: no posterior canine. A single dorsal fin with less spines (9) than rays (12-14); anal with two or three spines, and an equal number of rays to the soft dorsal. Scales small, no enlarged row at base of caudal fin. Lateral-line interrupted.

Geographical distribution.—East coast of Africa, seas of India to the Malay Archipelago.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Cymolutes prætextatus*, D. $\frac{9}{12}$, A. $\frac{3}{12}$, L. l. 73. Olive or greenish, with a dark band across the shoulder. East coast of Africa, Ceylon, Mauritius, to the Malay Archipelago.

1. Cymolutes prætextatus, Plate XC, fig. 1.

Julis prætextatus, Quoy and Gaim. Voy. Astrol. Pois. p. 712, pl. 15, f. 4; Cuv. and Val. xiii, p. 505.
Xirichthys torquatus, Cuv. and Val. xiv, p. 54. pl. 392.
Xirichthys novaculoides, Bleeker, Amboina, iii. p. 122.
Novacula xirichthoides, Bleeker, Nat. Tyds. Ned. Ind. x, p. 488.
Cymolutes prætextatus, Günther, Ann. Nat. Hist. 1861, p. 387, Catal. iv, p. 207, and Fish. Zanz. p. 102; Bleeker, Atl. Ich. i, p. 146, t. xxxi, f. 1.

B. vi, D. $\frac{9}{12}$, P. 13, V. 1/5, A. $\frac{3}{12}$, C. 13, L. l. 73.

Length of head 4 to $4\frac{1}{3}$, of caudal 7 to $7\frac{1}{2}$, height of body $4\frac{1}{3}$ in the total length. *Eyes*—high up, near dorsal profile, diameter $4\frac{1}{2}$ in the length of the head, 2 diameters from end of snout, and 1 apart. Snout parabolic: lower jaw slightly the longer. The greatest width of the head equals half its height. *Colours*—greenish, with a dark blue-edged band across the shoulder. *Variety*—"pale olive: head immaculate: body covered with narrow brown lines, angularly bent, the angle pointing backwards: these are generally darker on the shoulder. Sometimes a round black spot below the lateral-line, and under the sixth dorsal spine. Dorsal pale violet, with irregular reddish lines and spots: the specimens without the lateral blotch have a deep black margin to the spinous portion. Anal uniform orange or rosy: caudal orange, with yellowish transverse lines: ventrals and pectorals transparent."

Habitat.—East coast of Africa, Ceylon, Mauritius, to the Malay Archipelago. The specimen figured is from a specimen in the British Museum collection.

Genus, 16—Pseudodax, *Bleeker.*

Odax, sp. Cuv. and Val.

Branchiostegals six. Body oblong, compressed. Upper jaw with one, lower with two, pairs of broad incisors, having cutting lateral edges: teeth in the pharyngeals confluent and pavement-like. A single dorsal fin having nearly the same number of spines (11) *as rays* (12)*: anal with three spines and more rays* (14) *than the second dorsal. Scales of moderate size, extended over the cheeks and opercles: an enlarged row at base of caudal fin. Lateral-line continuous.*

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Pseudodax Moluccanus*, D. $\frac{11}{12}$, A. $\frac{3}{14}$, L. l. 32-33. Brownish red, with a dark spot on each scale of body and opercles. Nicobars to the Malay Archipelago.

1. Pseudodax Moluccanus, Plate LXXXIX, fig. 1.

Odax Moluccanus, Cuv. and Val. xiv, p. 305, pl. 408, fig. 2 (head); Cuv. Règ. Anim. Ill. Poiss. t. 91, f. 3; Bleeker, Manado, p. 64; Kner, Sitz. Wien Acad. 1860, p. 56, t. ii, f. 18 (Pharyngeal apparatus).
Pseudodax moluccanus, Bleeker, Atl. Ich. i, p. 80, t. xxii, f. 2, and t. xviii, f. 5; Günther, Catal. iv, p. 208; Guichenot, Mem. Soc. Imp. Sc. Nat. Cherb. 1865, p. 67.

B. vi, D. $\frac{11}{12}$, P. 15, V. 1/5, A. $\frac{3}{14}$, C. 14, L. l. 32-33, L. tr. 4/12.

Length of head $4\frac{1}{4}$, of caudal 8, height of body $3\frac{1}{3}$ in the total length. *Eyes*—diameter $5\frac{1}{2}$ in the length of head, 2 diameters from end of snout, and $1\frac{1}{4}$ apart. *Teeth*—the outer incisor on either side of symphysis of lower jaw recurved. *Colours*—back brownish-red, becoming lighter on the abdomen, most of the scales on the body with a dark central spot. Teeth green. Dorsal and anal yellow in their basal portion, the former having black reticulated lines, a dark base, and a blue margin: anal with from two to four dark undulating longitudinal bands and a dark blue-margined outer edge. Pectoral with a dark mark at its base. Caudal brown, with a blue posterior edge, some vertical darker bands, and the large scales at its base of a light buff colour.

Habitat.—Nicobars, east coast of Africa, to the Malay Archipelago. The specimen figured (8·2 inches in length) is from the Malay Archipelago, and for it I am indebted to Dr. Hubrecht, of Leyden.

Genus, 17—Scarichthys, *Bleeker.*

Body oblong, compressed. Upper lip double in its whole extent. Teeth in one row, anteriorly soldered together, those in the mandibles being in a very oblique row: the inferior pharyngeal toothed plate broader than long. A single dorsal fin with less spines (9) *which are flexible, than rays* (10) *: two anal spines and eight rays. Scales large, a single row on the cheeks. Lateral-line entire.*

Geographical distribution.—Red Sea east coast of Africa, seas of India, to the Malay Archipelago, and also tropical portion of the Pacific.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Scarichthys cœruleopunctatus*, D. $\frac{9}{10}$, A. $\frac{2}{8}$, L. l. 24. Head and body with numerous blue dots and spots. Red Sea to the Malay Archipelago.

1. Scaricththys cæruleopunctatus, Plate LXXXVII, fig. 5.

Scarus (Calliodon) cœruleopunctatus, Rüpp. N. W. Fische, p. 24, t. vii, f. 3; Cuv. and Val. xiv, p. 262; Bleeker, Banda, iii, p. 110.

Scarus bottæ, Cuv. and Val. xiv, p. 262.

Erychthys cœruleopunctatus, Swainson, Fishes, ii, p. 226.

Scarichthys cœruleopunctatus, Bleeker, Atl. Ich. i, p. 16, t. i, f. 2; Günther, Catal. iv, p. 213; Guichenot, Scarides, Mem. Soc. Imp. Cherbourg, 1865, t. xi, p. 19; Klunz. Verh. z. b. Ges. Wien, 1871, p. 557.

B. v, D. $\frac{9}{10}$, P. 14, V. 1/5, A. $\frac{2-3}{8-9}$, C. 13, L. l. 24.

Length of head $3\frac{3}{4}$ to 4, of caudal $6\frac{1}{4}$, height of body 4 in the total length. *Eyes*—diameter 5 in the length of head, 2 diameters from end of snout, and $1\frac{1}{4}$ apart. *Fins*—pectorals short, two-thirds the length of the head: caudal rounded. *Scales*—may be present or absent from the base of the dorsal fin. *Colours*—olive brown, the body and caudal fin covered with blue black-edged spots: two or three rows of brown spots on the dorsal, ventral, and anal fins.

The specimen figured is from the Malay Archipelago, and for it I am indebted to Dr. Hubrecht, of Leyden.

Habitat.—Red Sea, east coast of Africa, through the seas of India, to the Malay Archipelago.

Genus, 18—Callyodon, *(Gronov.)*, *Cuv. and Val.*

Body oblong, rather compressed. Teeth in both jaws, anteriorly compressed and imbricated, being in one row in the upper and two in the lower jaw, whilst laterally they are soldered into one deep-cutting lamina: the inferior pharyngeals, where the teeth (which are pavement-like) are present, broader than long. Anterior nostril with a barbel-like prolongation. A single dorsal fin with less spines (9) *than rays* (10)*: anal with two spines and less rays* (8) *than the soft dorsal. Scales large: a single row on the cheeks. Lateral-line strongly bent or interrupted below the posterior end of the dorsal fin.*

Geographical distribution.—From the Red Sea, through those of India to the Malay Archipelago, and inter-tropical seas generally.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Callyodon viridescens*, D. $\frac{9}{10}$, A. $\frac{2}{8}$, L. l. 24. Colours various. Brown or greenish and spotted: pectoral with a black base, and a similar spot between two first dorsal spines. Red Sea, east coast of Africa to the Andamans.

1. Callyodon viridescens, Plate XC, fig. 2.

Rüpp. N. W. Fische, p. 23, t. vii, f. 2; Günther, Catal. iv, p. 214, and Fish. Zanzibar, p. 103; Klunz. Verh. z. b. Ges. Wien, 1871, p. 558.

B. vi, D. $\frac{9}{10}$, P. 13, V. 1/5, A. $\frac{2}{8}$, C. 13, L. l. 24.

Length of head $3\frac{3}{4}$, height of body 3 in the total length. *Eyes*—diameter 5 in length of head, $1\frac{1}{2}$ diameters from end of snout. *Teeth*—no inner row in the upper jaw, but the outer tooth on either side is recurved. *Fins*—caudal truncated. *Scales*—lower third of dorsal fin covered by them. *Colours*—vary considerably, but it appears to have a black base to the pectoral, and a black spot between the first and second dorsal spines. It may be brown, marbled and spotted with darker; or green, with black dots on the sides, red streaks on the snout, and oblique brown marks on dorsal and anal fins. Or olive, becoming white below, and nearly every scale with a brick-red centre and white spots. Head and middle of body with scattered red spots having a dark centre. Two or three red lines on head, and a light lateral band from the angle of opercle to root of tail. Reddish-yellow spots on dorsal and caudal fins. Anal with a black edge and two red longitudinal bands that coalesce and enclose round white spots: ventrals white, pectorals yellow.

Habitat.—Red Sea, east coast of Africa to the Andamans. The specimen figured is from a fish in the British Museum collection.

Genus, 19—Pseudoscarus, *Bleeker.*

Hemistoma, Swainson.

Body oblong, somewhat compressed. The upper jaw projecting beyond the lower: the upper lip double in its whole extent. The anterior teeth soldered together, arranged in quincuncial order: the teeth in the inferior pharyngeal bones pavement-like, and the space they cover longer than broad. A single dorsal fin with less spines which are flexible (9) *than rays* (10)*: anal with two spines, and less rays* (8-9) *than the soft dorsal. Scales large, two or more rows on the cheeks: large ones at base of caudal fin. Lateral-line continuous.*

The fishes of this Genus appear to be subject to very great variation in colour, dependant perhaps on age, sex, season, or locality. Dr. Günther observed "their distinctive characters really appear to depend so much on the colours, which rapidly fade after death, that it will always be very difficult to determine preserved specimens," (Catal. iv, p. 217, 1862). He also remarked "by far the greater portion of our knowledge of this genus is due to the labours of Dr. v. Bleeker, who first pointed out the characters by which the species may be determined." Later (Zool. Record, 1866) he observed on the great variation of colours in fish belonging to this Genus, and in recording his own remarks on the Fishes of Zanzibar, he concluded that the three varieties of colours which he has shown in *P. Troschelli* "would be types of three distinct species according to Bleeker's views," (p. 149.) That colours alone should be considered a sufficient diagnosis of species, is I consider open to very grave doubt.

SYNOPSIS OF SPECIES.

1. *Pseudoscarus harid.* Caudal lobed. Three rows of scales on cheeks, none on lower preopercular limb. Upper lip broad, snout elongated. A pointed tooth at angle of mouth. Greenish, two red streaks from snout through the eye, and another on lips. Dorsal and anal fins reddish, edged with blue, and with blue bands or spots. Red Sea, seas of India to the Malay Archipelago.

2. *Pseudoscarus chrysopoma.* Caudal truncated. Three rows of scales on cheeks, the lower covering the inferior limb of preopercle. Upper lip broad. A pointed tooth at angle of mouth. Green, blue lines radiate from the eye and cover the lips. Dorsal and anal rosy, with a narrow band along their bases, and green edges. Seas of India and Malay Archipelago.

3. *Pseudoscarus ghobbam.* Caudal truncated. Two rows of scales on cheeks, the lower of which has five scales, and two scales on lower preopercular limb. Upper lip broad, no pointed tooth at angle of mouth (at least in the young). Lips blue, scales on body with blue edges, vertical fins reddish, with blue bases and edges. Red Sea, seas of India, to the Malay Archipelago.

4. *Pseudoscarus æruginosus.* Caudal truncated. Two rows of scales on cheeks and two scales on the lower preopercular limb. Upper lip broad. A pointed tooth at angle of mouth, present or absent. Olive, with three longitudinal silvery bands below the pectoral fin. Seas of India to the Malay Archipelago.

5. *Pseudoscarus rivulatus.* Caudal truncated. Two rows of scales on cheeks, the lower of which has six scales, and two scales on the lower preopercular limb. Upper lip broad. Usually a pointed tooth at angle of mouth. Green, each scale with a red base. Dorsal and anal reddish, spotted or banded with green. East coast of Africa, seas of India, to the Malay Archipelago.

6. *Pseudoscarus erythrodon.* Caudal rounded. Two rows of scales on cheeks, none on the lower preopercular limb. Upper lip very broad. A pointed tooth at angle of mouth. Purplish, a narrow black edge to dorsal fin. East coast of Africa, Andamans, to the Malay Archipelago.

7. *Pseudoscarus sordidus.* Caudal truncated. Two rows of scales on cheeks, none on the lower preopercular limb. Upper lip narrow. A pointed tooth at angle of mouth. Pink, green, or brown, sometimes with green lips and a blue or green band or spots along the dorsal and anal fins. Red Sea, east coast of Africa, to the Malay Archipelago.

1. Pseudoscarus harid.

Scarus harid, Forsk. p. 30; Gmel. Linn. p. 1282; Rüpp. Atl. Fische, p. 80, t. xxi, f. 1; Cuv. and Val. xiv, t. 404 (not description); Jerdon, M. J. L. and Sc. 1851, p. 135; Bleeker, Beng. en Hind. p. 54.

Scarus mastax, Rüpp. Atl. Fish. p. 80, t. xxi, f. 2, and N. W. Fische, p. 28; Cuv. and Val. xiv, p. 246; Bleeker, Batav. Nov. Nat. T. Ned. Ind. vi, p. 299.

Scarus Ruppellii, Cuv. and Val. xiv, p. 259.

Scarus cyanurus, Cuv. and Val. xiv, p. 261.

Scarus latus, (Ehrenb.) Cuv. and Val. xiv, p. 245.

? *Scarus longiceps*, Cuv. and Val. xiv, p. 241.

Petronason longicauda, Swainson, Fishes, ii, p. 226.

Pseudoscarus mastax, Bleeker, Atl. Ich. i, p. 35, t. x, f. 1.

Pseudoscarus harid, Günther, Catal. iv, p. 220; Klunz. Verh. z. b. Ges. Wien, 1861, p. 561.

B. v, D. $\frac{9}{10}$, P. 15, V. 1/5, A. $\frac{3}{9}$, C. 13, L. l. 25, Vert. 11/13.

Length of head 4 to $4\frac{1}{2}$, of caudal 4 to 5, height of body 4 in the total length. *Eyes*—situated in about the middle of the length of head, and about 4 diameters from the end of the snout, which is produced: upper lip broad. *Teeth*—a pointed one at the angle. *Fins*—anterior dorsal spines not so high as the succeeding ones: caudal lobes much produced in adult specimens. *Scales*—three rows on the cheeks, none on the lower preopercular limb. *Colours*—olive-green, with two red streaks passing from the forehead through the eye: lips red, and forming a narrow red band that passes towards the base of the pectoral fin: scales on body with a bluish basal spot and red margin. Dorsal and anal fins reddish edged with blue, and having several rows of blue or green spots. Upper rays of pectoral and outer ones of caudal blue, sometimes two vertical blue lines on the caudal. There may also be blue spots on the side above the vent.

Habitat.—Red Sea, east coast of Africa, seas of India, to the Malay Archipelago.

2. Pseudoscarus chrysopoma, Plate LXXXIX, fig. 2.

Scarus Quoyi, pt. Cuv. and Val. xiv. p. 273.
Scarus chrysopomus, Bleeker, Labr. p. 53.
Pseudoscarus viridis, Bleeker (not Bloch), Scar. p. 240, and Atl. Ich. i, p. 45, t. xvii, f. 3.
Pseudoscarus chrysopoma, Günther, Catal. iv, p. 221.

B. v, D. $\frac{9}{10}$, P. 14, V. 1/5, A. $\frac{3}{9}$, C. 13, L. l. 25.

Length of head $3\frac{2}{3}$ to $3\frac{3}{4}$, of caudal $8\frac{1}{4}$ to $8\frac{1}{2}$, height of body $3\frac{1}{4}$ to $3\frac{1}{3}$ in the total length. *Eyes*—diameter $5\frac{1}{2}$ to 6 in the length of head, $2\frac{1}{3}$ diameters from the end of snout, and 2 apart. Upper lip broad. *Teeth*—edges crenulated, a pointed tooth at the angle. *Fins*—dorsal spines subequal in length: caudal truncated, the angles being slightly produced in adults. *Scales*—three rows of scales on the cheeks, the inferior of which cover the lower limb of the preopercle, the centre row consists of five scales. *Colours*—green. Upper lip with one, lower with two cross bands, passing into a subtriangular spot between the eye and the angle of the mouth: three short lines radiate from the eye. Scales with a reddish margin. Dorsal and anal fins rosy, with a narrow band along their bases, and green margins: caudal green.

Habitat.—Seas of India and Malay Archipelago.

3. Pseudoscarus ghobbam.

Scarus ghobbam, Forsk. p. 28; Gmel. Linn. 1281; Cuv. and Val. xiv, p. 216 (not Rüpp. Atl. Fische, p. 78).
Scarus maculosus, Lacép. iv, pp. 5, 21, pl. 50, f. 3; Cuv. and Val. xiv, p. 235.
Scarus guttatus, (Sonnerat.) Bl. Schn. p. 294.
Scarus psittacus, Rüpp. Atl. Fische, p. 77, t. xx, f. 1; Cuv. and Val. xiv, p. 226; Cantor, Catal. p. 239; Bleeker, Batav. p. 495 (not *Scarus psittacus*, Forsk. p. 29).
Scarus pepo, Bennett, Fish. Ceylon, p. 28, pl. xxviii; Bleeker, Beng. en Hind. p. 54.
Scarus harid, Cuv. and Val. xiv, p. 247 (not pl. 404); Bleeker, Labr. p. 48 (not *Scarus harid*, Forsk. p. 30).
Scarus pyrrhostethus, Richards. Ich. China, p. 262.
Scarus haridoides, Bleeker, en spec. p. 104.
Pseudoscarus pyrrhostethus, Bleeker, Scar. p. 239, and Atl. Ich. i, p. 42, t. ix, f. 1; Günther, Catal. iv, p. 223; Kner, Novara Fische, p. 260.
Pseudoscarus Cantori, Bleeker, Scar. pp. 12, 13, and Atl. Ich. i, p. 43, t. ix, f. 2.
Pseudoscarus ghobbam, (not Günther, Catal. iv, p. 230), Klunz. Verh. z. b. Ges. Wien, 1871, p. 563.
Pseudoscarus maculosus, Günther, Catal. iv, p. 223, and Fish. Zanz. p. 105.

B. v, D. $\frac{9}{10}$, P. 15, V. 1/5, A. $\frac{3}{9}$, C. 13, L. l. 25.

Length of head $3\frac{3}{4}$ to 4, of caudal 8 to 9, height of body $3\frac{1}{3}$ to $3\frac{1}{2}$ in the total length. *Eyes*—diameter 5 to $5\frac{1}{4}$ in the length of head, and 2 diameters from the end of the snout. Upper lip broad. *Teeth*—rather small, crenulated on their edges, none at the angle in the young, but said to be sometimes present in the adult. *Fins*—dorsal spines subequal in length. Caudal truncated, with the outer rays somewhat produced in the adult. *Scales*—two rows on the cheeks, and two scales on the lower limb of the preopercle, the central row consisting of five scales. *Colours*—head reddish: jaws whitish: a blue cross band on the lips; a curved blue streak from the angle of the mouth to below the eye: scales on the body with blue edges: vertical fins red, with blue bases and margins: caudal sometimes with blue spots, and occasionally they are also present on the dorsal.

Habitat.—Red Sea, east coast of Africa, seas of India, to the Malay Archipelago.

4. Pseudoscarus æruginosus, Plate LXXXIX, fig. 3.

Scarus æruginosus, Cuv. and Val. xiv, p. 257; Bleeker, Labr. p. 58.
Scarus lacerta, Cuv. and Val. xiv, p. 217; Bleeker, Beng. en Hind. p. 54.
Pseudoscarus æruginosus, Bleeker, Atl. Ich. i, p. 40, t. xvii, fig. 2; Günther, Catal. iv, p. 229: Kner, Novara Fische. p. 261.

B. v, D. $\frac{9}{10}$, P. 14, V. 1/5, A. $\frac{3}{9}$, C. 13, L. l. 25.

Length of head $3\frac{1}{2}$ to $3\frac{3}{4}$, of caudal $8\frac{1}{2}$, height of body $3\frac{1}{2}$ to $3\frac{2}{3}$ in the total length. *Eyes*—diameter $4\frac{3}{4}$ to 5 in the length of head, $1\frac{3}{4}$ to 2 diameters from end of snout, and 1 to $1\frac{1}{2}$ apart. Upper lip broad and double in its whole extent. *Teeth*—in jaws of moderate size, some have, others are destitute of a small pointed one at the angle of the upper jaw. *Fins*—anterior dorsal spine rather shorter than the succeeding ones. Caudal truncated. *Scales*—two rows on the cheeks, the second of which contains five or six scales, whilst two more scales exist on the lower preopercular limb. *Colours*—olivaceous, with three longitudinal silvery bands along the abdomen below the pectoral fin.

Habitat.—Madras (from which locality there is a specimen at Paris), Andamans where it is common, to the Malay Archipelago and beyond.

5. Pseudoscarus rivulatus, Plate LXXXVII, fig. 6.

Labrus salnee moia, Russell, Fish. Vizag. ii, p. 14, t. cxix.
Scarus fasciatus, Cuv. and Val. xiv, p. 222.
Scarus rivulatus, (Kuhl. and v. Hass.) Cuv. and Val. xiv, p. 223.
Scarus Russellii, Cuv. and Val. xiv, p. 234; Bleeker, Beng. en Hind. p. 54.
Scarus rivulatoides, and *micrognathus*, Bleeker, Labr. pp. 55, and 56.
Pseudoscarus rivulatus, Bleeker, Scar. p. 240, and Atl. Ich. i, p. 44, t. ix, f. 3; Günther, Catal. iv, p. 222.
Pseudoscarus Russellii, Day, Proc. Zool. Soc. 1868, p. 154.

B. v, D. $\frac{9}{10}$, P. 14-15, V. 1/5, A. $\frac{3}{9}$, C. 13, L. l. 25.

Length of head $3\frac{3}{4}$, of caudal $7\frac{1}{2}$, height of body $3\frac{1}{3}$ in the total length. *Eyes*—diameter 6 in length of head, 2 diameters from end of snout and also apart. Upper lip broad. *Teeth*—each jaw with 2 small ones at the corner.* *Fins*—the anterior dorsal spines rather shorter than the succeeding ones: caudal rather truncated. *Scales*—two rows on the cheeks, and two scales on the lower limb of the preopercle, the lower row on the cheek consisting of six scales. *Colours*—green, each scale with a reddish base. Snout and cheeks with numerous undulating green lines, its ground colour reddish. A narrow green band along the base and edge of the dorsal fin, with an intermediate row of spots: anal green, becoming lighter towards its margin, which is edged with dark green: caudal with green spots. The specimen figured, variety *Russellii*, was sea green, each scale, except those on the chest, having a semilunar reddish base equal to about half its width: the scales between the bases of the ventral and anal fins reddish: head rosy: a few short blue lines radiate from the lower edge of the orbit: anteriorly one passes to the upper edge of the lip, which it skirts: another goes to its lower margin, which it encircles. Dorsal fin reddish, superiorly edged with light blue, a row of green spots along its centre, and another at its base: caudal reddish, with four or five vertical bluish-green bands: anal similar to dorsal: pectoral and ventral reddish, the outer ray being blue: eyes hazel.

Habitat.—East coast of Africa, through the seas of India to the Malay Archipelago and beyond. The figure is from a stuffed specimen (a female, 18 inches long) captured at Madras, July 12th, 1868.

6. Pseudoscarus erythrodon.

Scarus erythrodon, Cuv. and Val. xiv, p. 255.
Pseudoscarus Sumbawensis, Bleeker, Scar. p. 242, and Atl. Ich. i, p. 47, t. xv, f. 4; Günther, Catal. iv, p. 232.
Pseudoscarus erythrodon, Günther, Fish. Zanzibar, p. 107.

B. v, D. $\frac{9}{10}$, P. 15, V. 1/5, A. $\frac{3}{9}$, C. 13, L. l. 25.

Length of head $3\frac{1}{4}$, of caudal 8, height of body $3\frac{1}{3}$ to $3\frac{1}{2}$ in the total length. *Eyes*—diameter $4\frac{1}{2}$ to $5\frac{1}{2}$ in the length of the head, $1\frac{1}{2}$ to 2 diameters from the end of snout, and $1\frac{1}{4}$ apart. Upper lip broad. *Teeth*—free margins with crenulated edges, and in the adult a conical tooth at the angle. *Fins*—dorsal spines subequal in length. Caudal rounded. *Scales*—two rows on the cheeks, the lower of which is not extended over the lower limb of the preopercle. *Colours*—of a purplish brown, the edges of each scale being darker than their centres, the large scales covering the first 2/3 of the caudal fin dull yellowish, a violet tint in the thoracic region where the centres of some of the scales are of a light colour. Snout greenish-yellow. Vertical fins brown, the dorsal with a narrow black outer margin. Pectoral transparent.

Habitat.—East coast of Africa, Andamans to the Malay Archipelago. One specimen 2·7 inches long was taken at Port Blair.

7. Pseudoscarus sordidus.

Scarus sordidus, Forsk. p. 30; Gmel. Linn. p. 1281.
Scarus nigricans (Ehrenb.) Cuv. and Val. xiv. p. 213.
Scarus mentalis, (Ehrenb.) Cuv. and Val. xiv, p. 234.
Scarus Troschelli, Bleeker, Batav. p. 498.
Pseudoscarus Troschelli, Bleeker, Atl. Ich. i, p. 25, t. vii, f. 2; Günther, Catal. iv, p. 237, and Fish. Zanz. p. 168, pl. xiv, f. 1, 3, (? 2).
Pseudoscarus sordidus, Klunz. Verh. z. b. Ges. Wien, 1871, p. 568.

B. v, D. $\frac{9}{10}$, P. 15, V. 1/5, A. $\frac{3}{9}$, C. 13, L. l. 25.

Length of head $3\frac{1}{3}$ to $3\frac{1}{2}$, of caudal 8 to 9, height of body $3\frac{1}{4}$ to $3\frac{1}{3}$ in the total length. *Eyes*—from 6 to 8 diameters in the length of head, $2\frac{1}{2}$ to 3 diameters from end of snout and 2 apart. Jaws strong. Lips very narrow. *Teeth*—strong with their edges crenulated, the upper jaw with a pointed tooth at the angle. *Fins*—dorsal spines subequal in length, caudal truncated or slightly emarginate, and with its outer rays a little produced in adults. *Scales*—only 2 rows on the cheeks, none on the lower limb of preopercle. *Colours*—in different specimens differ widely, being pink, green or brown, and variously marked. Some have green lips and horizontal red marks across the cheeks, and the dorsal and anal fins may be with or without a central horizontal band or row of spots.

Habitat.—Red Sea, East coast of Africa, seas of India to the Malay Archipelago.

* In the specimen figured, *Pseudoscarus Russellii*, and also in two others in my collection I find no teeth at the angle of the mouth.

Family, XLII—CHROMIDES, *Müller.*

Branchiostegals five or six: pseudobranchiæ absent. Gills four. Body oblong or elevated. Small teeth in jaws, none on palate: inferior pharyngeal bones triangular with a median longitudinal suture. Dorsal fin single, the spinous portion being usually of greater extent than the soft: anal with three or more spines, its soft portion similar to that of the dorsal. Ventrals thoracic with one spine and five rays. Scales generally ctenoid. Lateral-line more or less interrupted. Air-vessel present. Pyloric appendages, when present, few.

Amongst the many genera into which this family of freshwater fishes is divided only one (*Etroplus*) has been discovered in India, the remainder being from Tropical Africa, and America.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Etroplus.* Body elevated. Spinous portion of dorsal fin more developed than the soft. Teeth lobate. Western and Coromandel coasts of India, also Ceylon.

Genus, I—Etroplus, *Cuv. and Val.*

Pseudetroplus, Bleeker.

Branchiostegals six: pseudobranchiæ present. Body elevated and compressed. Eyes lateral. Cleft of mouth small. Teeth in two rows (or even three) in the jaws, compressed and lobate at their summits. A single dorsal, the spinous portion being of greater extent (17-22) *than the rayed* (6-15); *anal spines more numerous* (12-16) *than the rays* (6-12). *Scales very slightly ctenoid, of moderate size, and extended on to the bases of the soft dorsal and anal fins. Lateral-line interrupted or abruptly ceasing. Air-vessel present, large and simple. Pyloric appendages absent.*

Geographical distribution.—The fishes of this genus are found from South Canara, southwards along the Malabar coast, in Ceylon, along the Coromandel coast as high as the southern portion of Orissa, whilst inland I have obtained them from Arcot. The *E. Suratensis* has the most extensive range, occupying the whole of the region adverted to, except inland, as it rarely exists many miles from the sea, but I have taken a few specimens at Vithry in the Wynaad, showing that it may be found in an elevated locality: it extends its range into brackish or even saline water. The *E. Canarensis* appears to be locally confined to Canara; whilst the *E. maculatus* extends throughout the region inhabited by the *E. Canarensis* and *E. Suratensis*, except that it is not found in Orissa, whilst in Madras its range covers many miles inland. This genus does not approach any known Malayan one, but is intimately connected with a new genus (*Paretroplus*) of freshwater fishes, that Dr. Bleeker has recently discovered amongst some received from Madagascar, (see Fish. Madagascar, p. 13, t. iv, f. 3.)

SYNOPSIS OF SPECIES.

1. *Etroplus Canarensis.* D. $\frac{21-22}{8}$, A. $\frac{14-16}{6-7}$. L. l. 30-31. Yellowish with eight slate coloured, dark, vertical bands. South Canara in fresh water.

2. *Etroplus maculatus.* D. $\frac{17-20}{8-10}$, A. $\frac{12-15}{8-9}$, L. l. 35. From one to three dark blotches along the sides. Each scale with a golden central spot. Fresh waters along the coasts of South Canara, Malabar, Ceylon, and Madras, whilst inland it is taken at least as far as Arcot.

3. *Etroplus Suratensis.* D. $\frac{18-19}{14-15}$, A. $\frac{12-13}{12-11}$, L. l. 35-40. Eight vertical dark bands, each scale on the body with a white central spot. Fresh waters and estuaries along the coast of South Canara, Malabar, Ceylon, and Madras to Orissa, on the Malabar coast it extends inland to the Wynaad.

1. Etroplus Canarensis, Plate LXXXIX, fig. 5.

B. vi, D. $\frac{21-22}{8}$, P. 15, V. 1/5, A. $\frac{14-16}{6-7}$, C. 16, L. l. 30-31, L. tr. $5\frac{1}{2}$/16.

Length of head $3\frac{2}{3}$ to $3\frac{1}{2}$, of caudal 4 to $4\frac{1}{2}$, height of body $2\frac{1}{4}$ to $2\frac{1}{2}$ in the total length. *Eyes*—diameter 3 to $3\frac{1}{3}$ in the length of head, 1 diameter from end of snout and also apart. *Teeth*—very distinctly lobate on either side. *Fins*—dorsal spines moderately strong, increasing in length to the fifth, from whence they continue of about equal length. Soft dorsal and caudal pointed: pectoral reaching to above fourth or

fifth anal spines: caudal emarginate. *Scales*—very finely ctenoid, or more scolloped at their edges. *Lateral-line*—continued for about 15 to 25 scales, when it either ceases or only exists as small open holes. *Colours*—yellowish-buff with about 8 vertical, blackish, slate-coloured bands, each scale being darkest at its base, and some having a light central yellow spot. Dorsal and caudal dirty greenish: pectoral yellow, with a black base: ventral and anal black.

Habitat.—South Canara, attaining at least $4\frac{1}{2}$ inches in length.

2. Etroplus maculatus, Plate LXXXIX, fig. 4.

Chætodon maculatus, Bloch, t. 427, f. 2; Bl. Schn. p. 228.

Glyphisodon kakaitsel, Lacép. iv, p. 543.

Etroplus maculatus, Cuv. and Val. v, p. 489.

Etroplus coruchi, Cuv. and Val. v, p. 491, and *Glyphisodon koruschi*, pl. 136; Jerdon, Madras Journal, xv, p. 142; Bleeker, Beng. en Hind. p. 52.

Etroplus maculatus, Bleeker, Beng. en Hind. p. 52; Günther, Catal. iv, p. 266; Kner, Novara Fische, p. 263; Day, Fishes of Malabar, p. 162.

Pullattay, Mal.; *Rallia*, Singalese (Boake); *Boorakas* and *Chella kassu*, Tamil.

B. vi, D. $\frac{17-20}{8-10}$, P. 14, V. 1/5, A. $\frac{12-15}{8-9}$, C. 16, L. l. 35, L. tr. 6/19, Vert. 15/13.

Length of head $3\frac{1}{2}$ to $3\frac{2}{3}$, of caudal 4 to $4\frac{1}{2}$, height of body $2\frac{1}{4}$ to $2\frac{1}{2}$ in the total length. *Eyes*—diameter 3 in length of head, rather above 1 diameter from end of snout and 1 apart. Profile rises abruptly to the dorsal, and is slightly concave between the snout and the upper margin of the orbit: lower profile not quite so convex as the upper. Lower jaw rather the longer: the maxilla extends two-thirds of the distance to the orbit. *Teeth*—trilobate but not quite touching one another. *Fins*—dorsal spines strong and occupying eleven-fourteenths of the entire fin; interspinous membrane deeply notched and longer than the spines: anal spines strong, and occupying seven-tenths of the base of the entire fin, the rays are the same as in the dorsal. Caudal lunated. *Scales*—scarcely ctenoid. *Colours*—yellowish, with a greenish back, and about seventeen horizontal lines of deep golden spots: occasionally there are a few along the dorsal fin, the back, and the abdomen, also on the anal. Between the dorsal spines and rays there are more spots, some being brown, and others yellow. Along the lateral-line there are three black finger-marks, the central being the largest, and darkest: ventral and anal fins stained with deep black. In specimens procured between January and May there is occasionally a reddish tinge at the extremity of the caudal fin, and a leaden or violet hue over the body, whilst the number of golden spots seems to have decreased.

In South Canara, the highest point on the Western coast where I have obtained this species, the formula of the fin rays was as a rule, D. $\frac{19-20}{9}$, A. $\frac{14-15}{9}$. At Madras the formula was usually D. $\frac{17-18}{9-10}$, A. $\frac{11-12}{9}$. Common along the coasts in every paddy field, tank, or piece of fresh water, and even occasionally found in back-waters. Specimens have been received from Arcot, showing that it exists some distance inland. It is eaten by the natives, but as it rarely, if ever, exceeds three inches in length, it is not employed as food by Europeans. Dr. Jerdon observes, "the eggs are not very numerous and are deposited in the mud at the bottom of the stream, and when hatched both parents guard their young for many days, vigorously attacking any large fish that pass near them." This species does not live long after its removal from water, and is therefore transported with some difficulty. It is very pretty in an aquarium, but exceedingly pugnacious, turning at times almost black with passion, and vigorously biting the nearest fish. It readily takes a worm as a bait.

Habitat.—Fresh waters along the coasts of Madras, and from South Canara along Malabar, and also found in Ceylon. It is captured at least sixty or eighty miles inland.

3. Etroplus Suratensis, Plate LXXXIX, fig. 6.

Chætodon Suratensis, Bloch, t. 217; Lacép. iv, p. 461.

Chætodon caris, Ham. Buch. pp. 125, 372.

Etroplus meleagris, Cuv. and Val. v, p. 486; Bleeker, Beng. en Hind, p. 52.

Etroplus maculatus, Jerdon, Madras Journ. xv, p. 142.

Etroplus suratensis, Günther, Catal. iv, p. 266; Kner. Novara Fische, p. 264; Day, Fishes of Malabar, p. 161.

Karssar and *Pillinchan*, Tam.; *Pitul-kas*, Hind.; *Cashi-mara*, Telinga, (*Jerdon*); *Cundahla*, Ooriah; *Corallia*, Singalese (*Boake*).

B. vi, D. $\frac{18-19}{14-15}$, P. 17, V. 1/5, A. $\frac{12-13}{12-11}$, C. 16, L. l. 35-40, L. tr. $5\frac{1}{2}$/17.

Length of head 4, of caudal about 4, height of body $2\frac{1}{4}$ in the total length, *Eyes*—diameter from 1/3 to 1/4 of length of head, nearly 2 diameters apart. Profile rises abruptly to the base of the dorsal: lower profile not quite so rounded as the upper. The maxilla extends more than half way to below the orbit: the lower jaw slightly the longer. *Teeth*—in a single row in each jaw, compressed, and with a small lobe on each side, whilst posterior to them in both jaws are one or two rows very much smaller, but of the same description and separated by a short interspace from the outer row. *Fins*—dorsal spines strong, the spinous portion occupying seven-tenths of the length of the base of the fin: the interspinous membrane deeply notched and longer than the spines: the fourth or fifth rays the longest, the last the shortest, being not quite a fourth of the length of the

longest ray: the anal spines occupy seven-tenths of the length of the base of the fin, and both spines and rays are the same as in the dorsal. Caudal slightly emarginate. *Scales*—very slightly ctenoid, extended on to the caudal, and along the base of the dorsal and anal fins. *Lateral-line*—in upper fourth of body, extending from sixteen to eighteen scales, and ceasing opposite the twelfth or fourteenth dorsal spine, or else continued for about six scales further in the form of a small round hole in each scale. *Colours*—of a light green, with eight vertical bands, the first passes over the occiput, the last across the base of the caudal, and the other six are intermediate. Most of the scales above the lateral-line have a central white pearly spot, whilst there are some irregular black spots over the abdomen. The dorsal, caudal, ventral and anal are of a dark leaden colour, the pectoral yellowish, with a jet black base. Specimens from the salt water are of a deep purple colour, the bands almost black, and the white spots consequently more distinct. During the monsoon time the colours of this fish are most beautiful, the eight vertical bands are more distinctly marked, the abdomen is nearly white, the back of a deep green, and the round white spot gleams on every scale like a small pearl. Very young fish have a large black ocellus, surrounded by a white margin, extending from the fourth to the tenth soft rays of the dorsal fin.

Very common in the pieces of fresh water along the coasts of Malabar and Coromandel as high as Orissa. It is excellent eating, especially when of a large size, and grows to upwards of a foot in length. It takes a bait freely, but is not so easily captured in a net, as it buries itself in the mud or dives beneath the net.

This fish termed "*Etroplus*—," by Jerdon (M. J. L. and Sc. 1851, p. 133) is this species, the figure is amongst Sir W. Elliot's collection of drawings, marked "Kallu sella kas," and also *Etroplus maculatus* showing Jerdon's mistake in his F. W. Fishes, where he terms *E. Suratensis*, *E. maculatus*.

Habitat.—Fresh and brackish waters along the coasts of Ceylon and India, as far as Orissa. Bloch named his fish received from the missionary John, *Suratensis*, on the supposition that it came from Surat. It does not appear however to be found in that locality, and more probably John obtained it at his station of Tranquebar where it is common. I have taken it inland in the Wynaad. The specimen figured is 7·5 inches in length.

ORDER, II—ANACANTHINI.

All the rays of the vertical and ventral fins articulated, the latter, when present, being jugular or thoracic. Air-vessel, if existing, not having a pneumatic duct.

The order of spineless fishes, or the *Anacanthinini*, has been divided into sub-orders.

A. *Anacanthini gadoidei*, the two sides of the head symmetrical.
B. *Anacanthini pleuronectoidei*, the two sides of the head apparently unsymmetrical.

SYNOPSIS OF FAMILIES.

A. Anacanthini gadoidei.

I. *Gadidæ*. Gill-openings wide, the membranes not attached to the isthmus. Ventral with several rays, or if only one, the first dorsal fin in two portions. Caudal free, or if united to vertical fins, the first dorsal in two portions. Rays of second dorsal well developed.

II. *Ophidiidæ*. Gill openings wide, gill membranes not attached to the isthmus. Ventral when present rudimentary and jugular. No separate portion of first dorsal fin: caudal usually united to vertical fin.

A. Anacanthini gadoidei.

FAMILY, I—GADIDÆ,* *Cuv.*

Gadoidei, pt. Cuv.

Pseudobranchiæ, when present, glandular and rudimentary. Body more or less elongated. Gill-openings wide: gill membranes, as a rule, not being attached to the isthmus. From one to three dorsal fins, occupying nearly the entire length of the back, the rays of the last being well developed: one or two anal fins; caudal usually free, but sometimes united to the dorsal and anal. The dorsal with a separate anterior portion. Ventrals jugular, consisting of several rays, or should they be reduced to a filament, the dorsal fin is divided into two. Scales cycloid, of moderate or small size. Air-vessel and pyloric appendages usually present.

Geographical distribution.—The fishes of this family are mostly confined to the sea, and as a rule, of the Arctic and temperate regions. The aberrant form *Bregmaceros* appears to be their sole representative in India. Recently (Nov. 1871) Dr. Günther has described a fish from Manado (Proc. Zool. Soc. 1871, p. 669) as *Pseudophycis peregrinus*, observing that it lives at great depths, and "the discovery of this fish is of the greatest interest, inasmuch as it is the first instance of a true Gadoid being found in the East Indian Archipelago, *Bregmaceros* being a much less typical form of this family."

SYNOPSIS OF SINGLE GENUS.

1. *Bregmaceros*. Body fusiform. Two dorsals, the first consisting of an occipital ray: the second and the anal having each a dwarfed central portion. Seas of India to the Philippines.

Genus, 1—BREGMACEROS, *Thompson*.

Calloptilum, Richardson; *Asthenurus*, Tickell.

Branchiostegals seven: pseudobranchiæ absent.† *Body fusiform, posteriorly compressed. Gill-openings very wide, the membranes being separated nearly to the chin, and not attached to the isthmus. Eyes lateral. Mouth anterior and oblique. Teeth in jaws minute and moveable, also on vomer, none on palate. Two dorsal fins, the*

* Sars observed (Ann. and Mag. Nat. Hist. 1868, ii, p. 389) that Codfish deposit their ova on the surface of the water, where, having floated for sixteen days, the embryo leaves the ovum.

† Present in genus *Bathymaster*. Cope.

anterior consisting of an elongated ray arising from the occiput: the second and the anal having each a central dwarfed portion almost forming a distinct fin. Ventrals jugular, consisting of five or six rays, the outer of which are elongated. Scales cycloid, of moderate size. Lateral-line continuous. Air-vessel present. Pyloric appendages few.

Geographical distribution.—These small fishes appear to inhabit the coasts and estuaries of India, China, and the Philippines to New Zealand.

SYNOPSIS OF SPECIES.

1. *Bregmaceros atripinnis.* D. 1/20 + XV + 22, A. 22 + 10 + 26, L. l. 70, L. tr. 18, Cæc. pyl. 2. Rich brown, becoming lighter on the abdomen: fins black, except the ventral, which is of a dirty white. Coasts of India, Burma, and the Andamans to New Zealand.

2. *Bregmaceros McClelland.* D. 1/16 + X + 15, A. 22 + X + 15, L. l. 64, L. tr. 6/8. Silvery: back shaded with green: occiput, upper half of pectoral, and first half of dorsal spotted with black. Coasts of India to China and the Philippines.

1. Bregmaceros atripinnis, Plate XCI, fig. 1.

Asthenurus atripinnis, Tickell, J. A. S. of Beng. 1865, p. 32. pl. i.
Bregmaceros atripinnis, Day, Proc. Zool. Soc. 1869, p. 522.
? *Calloptilum punctatum*, Hutton, Trans. N. Z. Inst. v, p. 267, pl. xi.
Bregmaceros punctatum, Günther, Ann. and Mag. 1876, p. 398.

D. 1/20 + XV + 22, P. 21, V. 6, A. 22 + 10 + 26, C. 17, L. l. 70, L. tr. 18, Cæc pyl. 2.

Length of head $6\frac{1}{3}$ to $6\frac{1}{2}$, of caudal 11 to 12, height of body 6 in the total length. *Eyes*—diameter 2/7 of length of head, 1 diameter from end of snout and also apart. Lower jaw rather the longer: the maxilla reaches to below the posterior third of the orbit. Gill membranes separated as far forwards as to below the front edge of the eye. *Teeth*—in jaws, none on palatines. *Fins*—the first dorsal consists of a single ray, which commences on the summit of the head, and reaches backwards to opposite the posterior extremity of the pectoral. First portion of the second dorsal higher than the body, its intermediate rays very low. Pectoral commences under the throat and is extended as far as the posterior third of the body. The anterior portion of the anal is not quite so high as that of the dorsal. Caudal slightly emarginate. *Scales*—cycloid, in parallel rows. *Lateral-line*—absent. *Air-vessel*—small, present. The cæcal appendages are large. *Colours*—of a rich brown, becoming lighter on the abdomen. Dorsal, pectoral, anal, and caudal fins black: ventrals of a dirty white: the younger the specimen the less dark it is, in the very young there is no black on the fins.

A figure of this species exists amongst Sir W. Elliott's drawings, it is marked "*Misalu maga*" found at Waltair, June 27th, 1853.

Habitat.—Bombay, coasts of India, Burma and the Andamans, to New Zealand: attaining at least 5 inches in length. The specimen figured, life-size, is in the Calcutta Museum, it came from Akyab where it was procured by the late Col. Tickell.

2. Bregmaceros McClellandi.

Thompson, Charlest. Mag. Nat. History, 1840, iv, p. 184; Günther, Catal. iv, p. 368; Day, Fishes of Malabar, p. 171.
Calloptilum mirum, Richards. Voy. Sulphur, p. 95, pl. 46, f. 4-7.

B. vii, D. 1/16 + X + 15, P. 25, V. 5-6, A. 22 + X + 15, C. 15, L. l. 64, L. tr. 6/8.

Length of head 1/7, of caudal 2/11, height of body 1/7 of the total length. *Eyes*—diameter 2/5 of the length of the head, 1/2 a diameter from end of snout, and 1 apart. Body fusiform, compressed posteriorly. Upper jaw slightly the longer, extending to behind the centre of the orbit. *Teeth*—in jaws, a few on the vomer, but none on the palatine bones. *Fins*—the first dorsal arises on the occiput in the form of a slender ray, which is rather longer than the head. The second dorsal commences in the middle third of the total length, its fourth ray the longest and the fin highest in front, each ray is unbranched but articulated, and very slender, the membrane is deeply notched: the succeeding ten rays being very short and slender, appearing almost like a distinct fin: whilst the last fifteen are lengthened and extend nearly to the base of the caudal. The anal is of much the same shape as the second dorsal. The ventral which arises under the throat, consists of six rays, the outer three of which are dilated, compressed, and extended so as to reach as far as about the twenty-first anal ray. *Scales*—cycloid, small. *Lateral-line*—continuous. *Colours*—silvery, the back shaded with green. Occiput and upper half of pectoral black, the first half of dorsal spotted with black.

Dr. Günther, Ann. and Mag. 1876, p. 398, appears to consider *Bregmaceros punctatum*, Hutton=to *B. atripinnis*, Tickell, as identical with *B. Macclellandi*, Thomp. which latter however besides differing in the extent of the fin-rays was said to have neither air-vessel nor cæcal appendages, whereas both are present in *B. atripinnis*.

Habitat.—The mouths of rivers and coasts of India to China, and the Philippine Islands: said to grow to about three inches in length.

FAMILY, II—OPHIDIIDÆ, *Müller*.

Pseudobranchiæ present or absent. Body more or less elongated. Gill-openings wide: the gill membranes not attached to the isthmus. Eyes of moderate size, rudimentary or absent. Barbels present or absent. Sometimes canine teeth in the jaws, the vomerine and palatine ones absent or present. Vertical fins usually confluent, without any distinct anterior dorsal or anal. The dorsal occupies the greatest portion of the length of the back. Pectorals may be absent: ventrals when present rudimentary and jugular, except in *Brotulophis*, where they are situated opposite to the pectorals. Scales present or absent: lateral-line when present may be single, double or interrupted. The vent may be at the throat. Air-vessel usually present. Pyloric appendages, when present, in small numbers.

Geographical distribution.—Fishes of this family are distributed in the seas and estuaries of nearly all parts of the globe.

SYNOPSIS OF GENERA.

Genus, 1—*Brotula.* Ventrals present and attached to the humeral arch. Indian Ocean to the Malay Archipelago and beyond.

Genus, 2—*Ammodytes.* No ventral fins, and the vent some distance from the head. Gill-openings wide, the gill membranes not being united.

Genus, 1—BROTULA, *Cuvier*.

Branchiostegals eight. Body elongated, compressed. Eyes of moderate size. Barbels present. Villiform teeth on jaws, vomer, and palatines. Vertical fins confluent: ventrals reduced to a single filament, which is sometimes bifurcated: the fin is attached to the humeral arch. Scales present, minute. Air-vessel large, either rounded posteriorly or with two horns. A single pyloric appendage.

SYNOPSIS OF INDIVIDUAL SPECIES.

Brotula maculata, D. 115, V. 1, A. 107. Six pairs of barbels. Light dirty greenish colour, with a few reddish brown spots about the body and a dark round mark behind the eye. Muzzle and rostral barbels black. Madras.

1. Brotula maculata, Plate XCI, fig. 2.

Day, Proc. Zool. Soc. 1868, p. 196.

B. viii, D. 115, V. 1, A. 107.

Length of head 1/6, of pectoral 1/8, of caudal 1/16, height of body 1/6 of the total length. *Eyes*—diameter 1/3 of length of head, 2/3 of a diameter from end of snout, 1/3 apart. Body eel-like, compressed: the maxilla extends to beneath the centre of the orbit. A strong spine at the opercle: two smaller ones at the angle of the preopercle. *Barbels*—two on the snout, and two on either side of the upper jaw: three pairs on the lower jaw, making in all six pairs. *Teeth*—in fine sharp rows, becoming single posteriorly; a small patch on the vomer, and a single row on the palate. *Fins*—not enveloped in skin: dorsal, caudal, and anal joined. Dorsal commences over the base of the pectoral: ventral two-thirds as long as the head, and reaching beyond the base of the pectoral. *Scales*—minute, covering body and head. *Air-vessel*—large, and rounded posteriorly. *Colours*—of a light dirty greenish-brown, with a few reddish-brown spots about the body, and a round blackish mark behind the eye. Muzzle and barbels of upper jaw blackish. Fins grayish, external portions deep black. Rather closely approaches *Brotula ensiformis*, Günther, but in that species the snout is longer than the eye, in this one-third shorter. The maxilla in *B. maculata* does not extend so far backwards as in the former species.

Habitat.—Madras, where the species was captured in November, 1867. The figure is taken from one of the types which are in the British Museum.

Genus, 2—AMMODYTES, *Artedi*.

Bleekeria, Günther.

Branchiostegals six to eight: pseudobranchiæ composed of lamellæ. Body low, elongated, and compressed. Gill-openings very wide, the gill-membranes not being united. Gills four. Eyes of moderate size. Barbels absent. Lower jaw usually prominent. Teeth, when present, minute. A single long dorsal fin, composed of feeble rays. Scales, if present, small, when absent the skin may have longitudinal folds along the abdomen. Lateral-line single. Air-vessel absent. Vent remote from the head.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Ammodytes kallolepis*, D. 40, A. 15, L. l. 100, L. tr. 3/14. Longitudinal bands. Madras.

1. Ammodytes kallolepis, Plate XCI, fig. 3.

Ammodytes, — ? Jerdon, M. J. L. and Sc. 1851, p. 139.
Bleekeria kallolepis, Günther, Catal. iv, p. 387.

B. vi, D. 37-40, A. 14-15, L. l. 100, L. tr. 3/14.

Length of head about 5, of caudal $6\frac{1}{2}$, height of body $10\frac{1}{4}$ in the total length. *Eyes*—in the commencement of the anterior half of the head, 2 diameters from the end of snout. Head and body compressed. Lower jaw slightly the longer, the upper very protractile, the posterior limb of the premaxillaries reaching to opposite the front edge of the orbit. *Teeth*—a few fine ones opposite the symphysis in either jaw. *Fins*—the dorsal commences above the first third of the pectoral, and does not extend to the base of the caudal, it is composed of simple articulated rays, the highest being equal to about half the height of the body. Pectoral as long as the head behind the middle of the eyes. Anal commences below the last two-fifths of the dorsal, its rays being rather higher. Caudal deeply forked. Free portion of the tail nearly twice as long as it is high at its base. *Scales*—none on the head. *Lateral-line*—high up. *Colours*—back and upper two-thirds of body bluish, lineated with about five yellowish horizontal bands, which are as wide as the ground colour. Dorsal fin with a bluish base and yellow bands: anal with a bluish band along its centre: caudal stained gray externally.

Habitat.—Coromandel coast at Waltair and Madras, from which latter locality Dr. Jerdon sent the specimen figured (life-size) to the British Museum. Several coloured drawings of examples of this fish are amongst Sir Walter Elliot's collection.

B. Anacanthini, Pleuronectoidei.

Structure of head apparently unsymmetrical on the two sides.

FAMILY, III—PLEURONECTIDÆ, *Flemming.*

Heterosomata, Bonaparte.

Pseudobranchiæ well developed. Gills four. Body strongly compressed, flattened, with one of its sides coloured, the other being destitute of colour, or having merely some spots. Both eyes (except in the very young) placed on the superior or coloured surface, sometimes rudimentary. The two sides of the head not equally developed,* one remaining almost rudimentary. The jaws and dentition may be nearly equally developed on both sides, or more so on the blind than the coloured. A single long dorsal and anal fin. Pectorals, if present, may be rudimentary. Scales present or absent. Lateral-line on the coloured side single, double, or triple, curved or straight. Air-vessel absent.

Geographical distribution.—These fishes are extended to most regions, residing at the bottom of the sea, some ascend rivers. The upper surface is coloured, and as observed by Adams (Voyage of the Samarang), "amongst the coral reefs where the Pleuronectidæ are frequently found, their tails are often ornamented with rather vivid colours, and their upper sides marked with somewhat striking patterns, whereas those that are half buried, are as dull and dingy as the surface is where they are found."

Dr. Sauvage (Comp. Rend. 1872, April), has observed that the various degrees of development of the termination of the vertebral column in the genera *Rhombus*, *Solea*, and *Pleuronectes*, are in accordance with their geological appearance.

SYNOPSIS OF GENERA.

A. Jaws and dentition nearly similar on both sides.

1. *Psettodes.* Dorsal fin commences on the neck: eye on right or left side.
2. *Citharichthys.* Dorsal fin commences before the eyes, which are on the left side. Teeth in a single unequal row in the jaws: lateral-line straight.
3. *Pseudorhombus.* Eyes on right side. Dorsal fin commences before the eyes. Teeth of upper jaw in two rows. Lateral-line with a strong curve anteriorly.
4. *Platophrys.* Eyes on left side, Dorsal fin commences before the eyes. Teeth in a single or double row. Lateral-line with a strong curve anteriorly.

B. Cleft of mouth narrow, and the dentition on the blind side most developed.

5. *Solea.* Eyes on right side: pectorals, if present, usually rudimentary: vertical fins not confluent. Scales ctenoid.
6. *Achirus.* Eyes on right side: pectorals, if present, rudimentary: vertical fin not confluent: dorsal and anal rays scaled. Scales cycloid or ctenoid.
7. *Synaptura.* Eyes on the right side: pectorals, if present, may be rudimentary. Vertical fins confluent. Scales ctenoid or cycloid.
8. *Plagusia.* Eyes on the left side: pectorals absent: vertical fins confluent. Two or three lateral-lines on the left side: lips with tentacles. Scales ctenoid or cycloid.
9. *Cynoglossus.* Eyes on the left side: pectorals absent: vertical fins confluent. Two or three lateral-lines on the left side. Lips without tentacles. Scales ctenoid or cycloid.

Genus, 1—PSETTODES, *Bennett.*

Sphagomorus, Cope.

Branchiostegals seven. Cleft of mouth deep, the maxilla being about half the length of the head. Gill-membranes scarcely united at the throat: gill-rakers replaced by groups of minute spines. Eyes on the right or left side. Jaws and dentition nearly equally developed on both sides. Two rows of curved, slender, sometimes barbed,

* Hr. Malm (Svensk. Vet. Akad. Handl. vii, No. 4, 1868) has shown that the skull is only apparently asymmetrical. The young Pleuronectoid is obliged, owing to the depth of its body, increased by the development of the vertical fins, to lie on one side when resting on the ground, as the horizontal fins are not sufficiently developed to sustain it in a vertical position. The eye of the "blind" side has a tendency to turn towards the light, in doing so it carries with it the surrounding cartilaginous frame-work of the skull.

† The terms right (*dextral*) or left (*sinistral*) are employed in these fishes with respect to the position of the coloured side. To ascertain this the fish is placed with its tail towards the observer, the dorsal fin upwards, the anal downwards.

distant teeth in either jaw, the anterior of the inner row in the mandible being received into a groove anterior to the vomer: teeth present on vomer and palate. Dorsal fin commencing on the nape. Most of the dorsal and anal rays branched. Scales small, ctenoid. Lateral-line gradually descends to the straight portion.

Geographical distribution.—from the west coast of Africa, through the seas of India to the Malay Archipelago and beyond.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Psettodes erumei*, D. 47-56, A. 35-41, L. l. 70-75. Either right or left side coloured, and vertically banded or not so.

1. Psettodes erumei, Plate XCI, fig. 4.

Pleuronectes erumei, Bl. Schn. p. 150.

Pleuronectes adalah, Russell, Fish. Viz. i, pp. 58, 59, and *Noree nalaka*, pls. 75, 77.

Hippoglossus erumei, Cuv. Règne, Anim.; Rüppell, Atl. Fische, p. 121, and N. W. Fische, p. 84; Cantor, Catal. p. 216; Bleeker, Verh. Bat. Gen. xxiv, Pleuronec. p. 13.

Hippoglossus nalaka, Cuv. Règne Anim.

Hippoglossus dentex, Richards. Voy. Sulphur, Fish. p. 102, pl. 47.

Hippoglossus orthorhynchus, Richard. Ich. China, p. 278.

? *Psettodes Belcheri*, Benn. Pro. Zool. Soc. 1831, p. 147.

Psettodes erumei, Günther, Catal. iv, p. 402; Kner, Novara Fische, p. 282; Klunz, Verh. z. b. Ges. Wien, 1871, p. 570.

Sphagomorus Belcheri, Cope, Trans. Amer. Phil. Soc. xiii, p. 407.

B. vii, D. 47-56, P. 16, V. 6, A. 35-41, C. 17, L. l. 70-75.

Length of head $4\frac{1}{6}$, height of body $2\frac{2}{3}$ in the total length. *Eyes*—diameter 6 in the length of head, and usually divided by a mere ridge, $1\frac{1}{4}$ diameters from end of snout. Lower jaw much the longer: the maxilla 4/5 of the length of the head. *Teeth*—strong, barbed at their extremities. *Fins*—most of the dorsal and anal rays branched: central caudal rays rather the longest. *Colours*—this fish may be coloured on either the left or the right side. Brownish or purplish-black, with the vertical fins edged with white: a lightish band usually present across the free portion of the tail. Cross bands have likewise been observed.

Habitat.—West coast of Africa, seas of India to the Malay Archipelago and China. It attains at least 16 inches in length.

Genus, 2—Citharichthys, *Bleeker.*

Psettichthys, Girard.

Gill-membranes broadly united at the throat. Cleft of mouth wide, and equally developed on both sides: the maxilla more than one-third of the length of the head. Eyes on the left side and on the same level. Teeth in jaws in a single row, without canines: none on vomer or palatines. Dorsal fin commences on the snout, and is not confluent with the caudal: its rays simple. Pectorals present. Scales small, deciduous, ctenoid or cycloid. Lateral-line straight.

Geographical distribution.—Madras, tropical parts of Atlantic.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Citharichthys aureus*, D. 82, A. 70, L. l. 83. First dorsal ray elongated. Orange, with dark marks. Madras.

I. Citharichthys aureus, Plate XC, fig. 3.

B. vi, D. 82, P. 10, V. 6, A. 70, C. 15, L. l. 83.

Length of head $4\frac{1}{3}$, height of body $2\frac{3}{4}$ in the total length. *Eyes*—on the left side, diameter 6 in the length of head, 1 diameter from end of snout, and also apart: the upper not in advance of the lower. Jaws of equal length anteriorly: height of head 1/4 more than its length. The maxilla 2/5 of the length of the head, and reaching to below the front edge of the eyes. *Teeth*—in a single row in the jaw, no canines: none (?) on the palate. *Fins*—anterior dorsal spine elongated, commencing on the snout, and being rather longer than the head, the middle dorsal rays are 2/3 of the length of the head. Dorsal and anal not united to the caudal, which is pointed. Two short ventrals not united to anal. Both pectorals present, but short. No pre-anal spine. *Lateral-line*—two on the coloured side, straight, divided by about 13 rows of scales, which latter are cycloid: fin-rays not scaled. *Colours*—orange, with two brown blotches on the lateral-line, and some cloudy markings on the body: vertical fin with dark edges.

Habitat.—Madras, where this single specimen was captured. Owing to its small size it is impossible to say whether it has or has not teeth on the palate.

Genus, 3—Pseudorhombus, *Bleeker.*

Chænopsetta, Gill.

Branchiostegals six. Cleft of mouth deep, the maxilla being usually nearly half as long as the head.

Gill-membranes united beneath the throat but not attached to the isthmus, Gill-rakers lanceolate. Eyes on the left side without a free orbital edge : interorbital space not concave. Jaws and dentition nearly equally developed on both sides : teeth in both jaws of unequal sizes and in a single row : vomer, palate, and tongue edentulous. Fin rays simple, the dorsal commences on the snout, its rays, and those of the anal, are simple. Scales of moderate size, or rather small, and extended on to the dorsal and anal fins. Lateral-line having a strong curve anteriorly.

Geographical distribution.—East coast of Africa, seas of India to the Malay Archipelago, also to the Pacific coasts of central and south America.

SYNOPSIS OF SPECIES.

1. *Pseudorhombus arsius*, D. 71-79, A. 54-61, L. l. 75-85. From five to ten pointed teeth in either jaw. Two dark blotches on the straight portion of the lateral-line. East coast of Africa, through seas of India to the Malay Archipelago and Australia.
2. *Pseudorhombus Javanicus*, D. 69, A. 52-53, L. l. 70-75. From 20 to 30 teeth in either jaw. Three dark blotches along the straight portion of the lateral-line. Madras to the Malay Archipelago.
3. *Pseudorhombus triocellatus*, D. 69, A. 51, L. l. 65-70. Teeth minute. Three heart-shaped purplish blotches placed in the form of a triangle on the coloured side. Madras to the Malay Archipelago.

1. Pseudorhombus arsius, Plate XCI, fig. 5.

Platessa Russellii, Gray and Hard. Ill. Ind. Zool. t. xciv, f. 2 ; Cantor. Catal. p. 214.
Rhombus letiginosus, Richards. Ann. and Mag. xi, 1843, p. 495 ; Bleeker, Pleur. p. 15.
Platessa chrysoptera, Richards. Ich. China, p. 278.
Rhombus arsius, Bleeker, Beng. en Hind. p. 76.
? Rhombus polyspilus, Bleeker, Batav. p. 203.
Pseudorhombus Russellii, Günther, Catal. iv, p. 424 ; Kner, Novara Fische, p. 283 ; Day, Fish. Malabar, p. 172 ; Bleeker, Atl. Ich. Pleuronec. p. 6, t. 233, fig. 2.
Pseudorhombus arsius, Günther, l. c. p. 426.
? Pseudorhombus polyspilus, Bleeker, l. c. p. 7, t. 237, f. 3.

B. vii, D. 71-79, P. 11 or 12, V. 6, A. 54-61, C. 17, L. l. 75-85.

Length of head $4\frac{1}{4}$ to $4\frac{1}{3}$, of caudal $6\frac{1}{2}$, height of body $2\frac{1}{3}$ to $2\frac{1}{2}$ in the total length. *Eyes*—diameter 5 in length of head, 1 diameter from end of snout, and closely approximating, being divided by a mere ridge. Lower jaw the longer, the maxilla reaches to below the hind third of the eye. *Teeth*—from five to eight in the lower jaw on the left side, and six to ten on the right. *Fins*—dorsal fin not continuous with the caudal, its longest rays are in the last third of the fin, all except the last three or four being unbranched, they slightly project beyond the membrane : the last five anal rays branched, each fin ray has a row of small scales. Pectoral two-thirds of length of head. Caudal wedge-shaped, its central rays being the longest : pre-anal spine when present but slightly apparent. *Scales*—ctenoid on the left, cycloid on the right side : largest in the posterior portion of the body : some on the maxilla. *Lateral-line*—smooth, its anterior curve is equal to half its length, the depth between the lateral-line (just beyond its curve) and the dorsal fin equals the distance from the snout to the base of the pectoral. The dorsal branch of the lateral-line goes to the base of the ninth, tenth, or eleventh ray. Free portion of the tail three times as high as long. Gill-rakers 1/2 as long as orbit. *Colours*—left side reddish-brown, usually covered with variously sized rings, and often two dark ocelli on the straight portion of the lateral-line.

Dr. Bleeker distinguishes *P. Russellii*=*P. arsius*, as having L. l. 85, seven to nine teeth in the left side of the lower jaw, and nine to fourteen on the right : the body (in comparison with *P. polyspilus*) is said to be more elevated, and the profile from the neck to the dorsal more convex : teeth more numerous : whilst the dorsal branch of the lateral-line commences at the eighth or ninth dorsal ray.

P. polyspilus, L. l. 75 to 80, five to eight teeth on both sides of the lower jaw. Head and body with numerons black spots surrounded by blue. Dorsal branch of the lateral-line commencing below the tenth dorsal ray.

1 have examined 16 specimens in my collection taken indiscriminately and with the following results :—

1	Spee.	9·5 in. long.	Sind.	D. 79,	A. 59,	L. l. 85,	branch from	11th d. ray.	Height of body $2\frac{1}{3}$ in the total	: teeth 5 upper,	8 lower jaw.
1	,,	8·0 ,, ,,	,,	D. 78,	,, 56,	,, 78,	,, ,,	10th ,,	,, ,, $2\frac{1}{2}$,, ,,	: ,, 7 ,,	10 ,,
1	,,	7·5 ,, ,,	,,	D. 71,	,, 57,	,, 85,	,, ,,	10th ,,	,, ,, $2\frac{1}{3}$,, ,,	: ,, 6 ,,	7 ,,
1	,,	7·3 ,, ,,	,,	D. 77,	,, 59,	,, 81,	,, ,,	10th ,,	,, ,, $2\frac{1}{2}$,, ,,	: ,, 7 ,,	9 ,,
1	,,	7·1 ,, ,,	,,	D. 76,	,, 59,	,, 80,	,, ,,	10th ,,	,, ,, $2\frac{1}{2}$,, ,,	: ,, 8 ,,	10 ,,
1	,,	6·5 ,, ,,	Andamans.	D. 75,	,, 58,	,, 74,	,, ,,	10th ,,	,, ,, $2\frac{1}{2}$,, ,,	: ,, 5 ,,	5 ,,
1	,,	7·0 ,, ,,	,,	D. 73,	,, 58,	,, 78,	,, ,,	10th ,,	,, ,, $2\frac{1}{3}$,, ,,	: ,, 5 ,,	5 ,,
1	,,	6·4 ,, ,,	,,	D. 74,	,, 58,	,, 78,	,, ,,	10th ,,	,, ,, $2\frac{1}{3}$,, ,,	: ,, 5 ,,	6 ,,
1	,,	5·4 ,, ,,	,,	D. 76,	,, 61,	,, 78,	,, ,,	11th ,,	,, ,, $2\frac{1}{4}$,, ,,	: ,, 5 ,,	5 ,,
1	,,	8.0 ,, ,,	Madras.	D. 78,	,, 59,	,, 78,	,, ,,	10th ,,	,, ,, $2\frac{1}{3}$,, ,,	: ,, 7 ,,	10 ,,
1	,,	6·5 ,, ,,	,,	D. 74,	,, 56,	,, 74,	,, ,,	9th ,,	,, ,, $2\frac{1}{4}$,, ,,	: ,, 5 ,,	8 ,,
1	,,	6·5 ,, ,,	,,	D. 75,	,, 57,	,, 80,	,, ,,	10th ,,	,, ,, $2\frac{1}{3}$,, ,,	: ,, 7 ,,	10 ,,
1	,,	5·3 ,, ,,	,,	D. 76,	,, 59,	,, 78,	,, ,,	10th ,,	,, ,, $2\frac{1}{3}$,, ,,	: ,, 6 ,,	9 ,,
1	,,	8·0 ,, ,,	Canara.	D. 74,	,, 55,	,, 76,	,, ,,	9th ,,	,, ,, $2\frac{1}{4}$,, ,,	: ,, 5 ,,	9 ,,
1	,,	6·2 ,, ,,	,,	D. 71,	,, 54,	,, 79,	,, ,,	10th ,,	,, ,, $2\frac{1}{3}$,, ,,	: ,, 7 ,,	11 ,,
1	,,	6·0 ,, ,,	,,	D. 72,	,, 54,	,, 80,	,, ,,	10th ,,	,, ,, $2\frac{1}{3}$,, ,,	: ,, 10 ,,	5 ,,

Thus I do not find the scales along the lateral-line as a rule so numerous as recorded from the Malayan examples, for out of 16 specimens two had 85, one had 81, three had 80; one had 79, six had 78; one had 76, and two had 74. The dorsal branch of the lateral-line varied from the ninth to the eleventh dorsal ray. The teeth likewise showed great differences in number.

Pleuronectes, Russell, Fish. Vizag. i, p. 58, and *Noree nalaka*, pl. 75, or *Rhombus maculosus*, Cuv. Règ. Anim. and Jerdon, M. J. L. and Sc., is probably this species marked as in pl. 91, f. 5.

P. arsius, H. B., is this species which is not uncommon at Calcutta, and is coloured as figured (MS.) by Hamilton Buchanan.

Pseudorhombus oligodon, Bleeker, is distinguished from this species, more especially by its possessing ctenoid scales on both sides of the body.

Habitat.—From the east coast of Africa, through the seas and estuaries of India, to Australia. It attains at least a foot in length. The specimen figured is 7·4 inches in length, and from the Andamans.

2. Pseudorhombus Javanicus,* Plate XCII, fig. 2.

Rhombus Javanicus, Bleeker, Batav. p. 503.

Pseudorhombus Javanicus, Günther, Catal. iv, p. 427; Bleeker, Atl. Ich. Pleuron. p. 8, t. ccxxii, f. 3.

B. vi, D. 69, P. 10, V. 6, A. 52-53, C. 18, L. l. 70-75.

Length of head $4\frac{1}{4}$, height of body $2\frac{1}{2}$ in the total length. *Eyes*—diameter $4\frac{1}{4}$ in the length of head, 1 diameter from the end of snout: they are divided by a mere ridge. Lower jaw the longer: the maxilla reaches to below the middle of the eye. Anterior nostril with rather a tubular valve posteriorly. Head as high as long. *Teeth*—small, sharp, conical, subequal in size, upwards of 30 in either side of upper jaw, and from 22 to 25 on either side of the lower. *Fins*—anterior dorsal rays not higher than the middle ones, which equal nearly half the length of the head. Pectoral as long as the head behind the middle of the eyes. A well-developed preanal spine. *Scales*—ctenoid on the coloured, cycloid on the blind side. *Lateral-line*—with a strong anterior curve: the nuchal branch goes to the tenth dorsal ray. *Colours*—of a purplish-brown, having three black spots on the lateral-line, surrounded by a row of white dots, or else a light blotch surrounded by a dark ring: the first of these spots is at the commencement of the straight portion of the lateral-line. There are two or three other spots variously placed, usually one is below the last third of the pectoral fin, midway between the lateral-line and the abdominal profile: another above the arch of the lateral-line, and a third between the straight portion of the lateral-line and the back. The whole of the coloured side is more or less covered with dots or dark rings, which are also continued on to the vertical fins.

Bleeker gives D. 73 to 76, A. 54-56, height of body $2\frac{5}{6}$ to $2\frac{2}{3}$ in the total length.

Habitat.—Coromandel coast of India to the Malay Archipelago. The one figured is from Madras.

3. Pseudorhombus triocellatus, Plate XCII, fig. 1.

Pleuronectes triocellatus, Bl. Schn. p. 145.

Pleuronectes, Russell, Fish. Vizag. i, p. 59, and *Nooree-nalaka*, pl. 76.

Rhombus triocellatus, Cuv. Règ. Anim.; Bleeker, Sumatra, iii, p. 528; Jerdon, M. J. L. and Sc. 1851, p. 147.

Rhombus triocellatus, Bleeker, Beng. en Hind. p. 76.

Pseudorhombus triocellatus, Günther, Catal. iv, p. 428; Kner, Novara Fische, p. 285.

Patné sootong, Tam. (Jerdon).

B. vi, D. 66-69, V. 5, A. 49-51, L. l. 65-70.

Length of head $4\frac{1}{4}$ to $4\frac{1}{3}$, height of body 2 in the total length. *Eyes*—with their anterior margins on nearly the same level, diameter 4 in the length of the head, 1 diameter from the end of snout, and a mere ridge dividing the two. Lower jaw slightly the longer, the maxilla reaches to below the middle of the eye. Height of head 1/4 more than its length. The maxilla 4/7 of length of head. Posterior nostril patent, anterior more tubular, and with a short barbel-like prolongation. *Teeth*—minute. *Fins*—both ventrals present, Anterior dorsal rays elevated, a rather strong preanal spine. *Scales*—ctenoid on coloured, cycloid on the blind side. *Lateral-line*—height of its curve equals half its length. *Colours*—of a rich brown, with three large heart-shaped purplish ocelli, each having a light centre and a yellowish circumference, situated in the form of a triangle, the two anterior on a vertical line slightly anterior to the centre of the total length of the fish, the central one midway between them and the base of the caudal. Vertical fins dusky yellow, covered with irregularly shaped dark blotches: pectoral yellowish, with some fine black spots.

Habitat.—Madras, to the Malay Archipelago. It attains to six or eight inches in length.

* *Pseudorhombus (Pleuronectes) nauphela*, Ham. Buch. Fish. Ganges, p. 126, is said to have D. 73, A. 55, shaped like the head of a lance. Lives in the Gangetic estuaries, where it attains about 8 inches in length. *Colours*—greenish-brown, on which are some scattered black spots. This species I have been unable to recognize, unless it is this fish.

Genus, 4—PLATOPHRYS, *Swainson.*

Bothus, Bp.; *Rhomboidichthys*, Bleeker.

Branchiostegals six. Cleft of mouth moderate or of small extent, the maxilla being about one-third or less in the length of the head. Eyes on the left side separated by a concave interorbital space of varying extent. Jaws and dentition nearly equally developed on both sides: teeth minute, of an equal size and in a single or double row. Vomerine and palatine teeth, as a rule, absent. The dorsal fin commences on the snout, its rays and those of the anal are simple. Scales ctenoid, and extended on to the dorsal and anal rays. Lateral-line having a strong curve anteriorly.

This genus has been divided into *sub-genera* as follows:—(1) scales very small, *Rhomboidichthys*: (2) of moderate size (40 rows in lateral-line) and deciduous, *Platophrys*: (3) of moderate size and not deciduous, *Engyprosopon.*

Geographical distribution.—From the Red Sea, through tropical seas to Japan, also in the Mediterranean.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Platophrys pantherinus*, D. 85-91, A. 65-70, L. l. 75-85. Upper pectoral rays may be elongated. Purplish, with 3 large spots along the middle of the body, and dark rings scattered over the body and fins. Red Sea, east coast of Africa, Andamans, to the Malay Archipelago and beyond.

1. Platophrys pantherinus, Plate XCII, figs. 3 and 4.

Rhombus pantherinus, Rüpp. Atl. p. 121, t. 31, f. 1, and N.W. Fische, p. 84; Bleeker, Kokos, iii, p. 178.
Rhombus pavimanus, Bennett, Proc. Zool. Soc. 1831, p. 168.
Rhombus sumatranus, Bleeker, Pleuron. p. 14.
Rhomboidichthys leopardinus, Günther, Catal. iv, p. 434 (? *female*).
Rhomboidichthys pantherinus, Günther, Catal. iv, p. 436; Klunz. Verh. z. b. Ges. Wien, 1871, p. 571.
Platophrys pantherinus, Bleeker, Atl. Ich. Pleuron. p. 11, t. 233, f. 3.

B. vi, D. 85-91, P. 10, V. 6, A. 65-70, C. 18, L. l. 75-85.

Length of head $4\frac{1}{4}$, height of body $2\frac{1}{6}$ in the total length. *Eyes*—diameter $3\frac{3}{4}$ to 4 in the length of head, 3/4 to 1 diameter from end of snout, and 1 diameter apart: one half of the lower eye anterior to the upper orbit. Lower jaw somewhat the longer: the maxilla reaches to below the first third of the lower orbit, there is a knob on its upper portion, sometimes also one on the orbit. Head one-fourth higher than long. Some have a barbel above the eye, others have none. *Teeth*—small, in two rows in the maxilla. *Fins*—anterior dorsal rays not longer than the middle ones, which are nearly half the length of the head. Pectoral not so long as the head, except in the upper elongated rays, which may be present or absent, and are probably distinctive of sex. *Colours*—of a purplish-brown on the coloured side, with three dark spots along the middle of the body, others variously scattered, also some rings of a dark colour: vertical fins with brown spots and white dots.

Habitat.—Red Sea, east coast of Africa, Andamans to the Malay Archipelago and beyond. The two figured (life-size) were from Port Blair.

Genus, 5—SOLEA, *Klein.*

Cleft of mouth narrow, twisted round to the left side. Eyes on the right side, the upper being partially or entirely in advance of the lower. Nostrils variously formed. Dentition most developed on the blind side, where the teeth in the jaws are in villiform rows, none on vomer or palate. The dorsal fin commences on the snout, and is not confluent with the caudal: pectorals present or absent. Scales small, ctenoid. Lateral-line straight.

This genus has been sub-divided:—
A.—Pectorals developed, *Microbuglossus.*
a.—Nostrils on blind side not dilated, *Solea.*
b.—One of nostrils on blind side dilated and broadly fringed, *Pegusa.*
B.—Pectorals on both sides rudimentary or small, *Buglossus.*
Pectorals absent, *Aseraggodes.*

Geographical distribution.—All tropical as well as temperate seas.

SYNOPSIS OF SPECIES.

A. *Pectorals present.*

1. *Solea heterorhina*, D. 87-94, P. 8, A. 78-82, L. l. 105-110. Anterior nostril tubular, longer than the orbit. Brown, with vertical bands, blotches or spots edged with black. Andamans to the Malay Archipelago.
2. *Solea elongata*, D. 70-73, P. 9, A. 60-62, L. l. 120. Height of body 3 in the total. Scales strongly ctenoid. Stone colour, with black spots and blotches. Madras.
3. *Solea ovata*, D. 60-66, P. 9, A. 42-49, L. l. 110. Height of body $2\frac{1}{4}$ in the total. Scales strongly ctenoid. Stone colour with black spots and blotches. Coromandel coast of India to China.

B. *Pectorals absent.*

4. *Solea Indica*, D. 55, A. 44, L. l. 75. Brownish, vertical fins darker. Madras.

A. *Pectorals present.*

1. Solea heterorhina, Plate XCII, fig. 5.

Solea heterorhinus, Bleeker, Amboina, p. 64, and Atl. Ich. Pleur. p. 17, t. 211, f. 2.
Soleichthys heterorhinus, Bleeker, En. Spec. p. 183.
Solea heterorhina, Günther, Catal. iv, p. 466.

B. vi, D. 87-94, P. 8, V. 4, A. 78-82, C. 16, L. l. 105-110.

Length of head $6\frac{1}{2}$ to 7, height of body $3\frac{1}{3}$ to $3\frac{1}{2}$ in the total length. *Eyes*—close together, the upper slightly in advance of the lower, diameter $4\frac{1}{2}$ in the length of head, and about 1/2 a diameter from the end of the snout. Head 1/3 higher than long. Cleft of the mouth extends to below the first third of the lower orbit. Two nostrils, the posterior just in front of the lower orbit, the anterior a little before it, consisting in the adult, of a long tube which being laid backwards reaches the hind edge of the eyes, it is not so elongated in the young: a short tubular nostril on the blind side. *Fins*—dorsal and anal rays unbranched. Pectoral on the coloured side short, the two upper rays being considerably longer than the lower ones: on the blind side this fin is rudimentary. Free portion of the tail very short. *Scales*—feebly ctenoid on both sides. *Lateral-line*—straight and in simple tubes. *Colours*—of a rich brownish olive, with irregular vertical bands, blotches, and spots edged with black.

Habitat.—Andamans to the Malay Archipelago. The specimen (figured life-size) was from Port Blair, where it was captured by Dr. Dobson.

2. Solea elongata, Plate XC, fig. 4.

B. vi, D. 70-73, P. 9, V. 4, A. 60-62, C. 18, L. l. 120.

Length of head $5\frac{1}{4}$, height of body 3 in the total length. *Eyes*—upper on the same level anteriorly as the lower, diameter 5 in length of head, 1/2 a diameter apart, and 1 from the end of snout. Upper jaw slightly the longer: numerous short tentacles about the blind side of the head, lips not fringed. Angle of the jaws beneath the anterior third of the lower orbit. Two nostrils, a small one in front of lower eye, and a tubular one anterior to it: that on the blind side concealed. Height of head rather exceeds its length. *Fins*—dorsal and anal rays unbranched, the highest equals 1/4 of that of the body. Pectoral on the coloured side equals rather above 1/2 length of head, and is much longer than that on the blind side: both ventrals present. *Scales*—feebly ctenoid on both sides, present on dorsal and anal rays. *Colours*—of an olive stone-colour, irregularly vertically banded, with black spots and blotches, fins also spotted. Centre of pectoral with a black blotch. Fins also spotted.

This fish is closely allied to *Solea ovata*, but has a much lower body and A. 60-62, instead of A. 42-49.

Habitat.—Madras, where two specimens were obtained.

3. Solea ovata, Plate XCIII, fig. 1.

Richardson, Ich. China, p. 279; Günther, Catal. iv, p. 472 (not Cantor).
Solea ——? Jerdon, Madras, Journal Lit. and Science, 1851, p. 147.

B. vi, D. 60-66, P. 9, V. 5, A. 42-49, C. 12, L. l. 110.

Length of head 5 to $5\frac{1}{4}$, height of body $2\frac{1}{4}$ in the total length. *Eyes*—upper one-half in advance of the lower, diameter 5 in the length of head, 3/4 of a diameter apart, and the lower $1\frac{1}{4}$ diameters from the end of snout. Height of head 1/3 more than its length. Upper jaw a little the longer, numerous short tentacles about the blind side of the head, lips not fringed. Angle of the mouth below the middle of the lower orbit. Two nostrils, a small open one just in front of the lower eye, and a tubular one anterior to it: that of the blind side not dilated, concealed. *Fins*—dorsal and anal rays, except the last few, unbranched, the highest being about $3\frac{1}{4}$ in that of the body, pectoral on the coloured side two thirds as long as the head and half longer than the one on the blind side. Both ventrals present. *Scales*—strongly ctenoid, present on dorsal and anal rays. *Colours*—of an olive brown, with spots and blotches of black on the coloured side of body and vertical fins. Pectoral deep black in its outer two-thirds, or else with a black blotch.

Solea maculata (Cuvier), Bleeker, so named from a Pondicherry specimen, collected by Kuhl and v. Hasselt, is probably this species. Bleeker observes that *Solea humilis*, Cantor=*S. ovata* (Richards.), Cantor and he places *S. maculata* as a synomym. *S. humilis*, Cantor, has L. l. 95-100.

Habitat.—Madras to China, the one figured was the largest obtained at Madras, where it is termed *Selli-patté* according to Jerdon.

B. *Pectorals absent.*

4. Solea Indica.

Günther, Catal. iv, p. 474.

B. vi, D. 55, V. 4, A. 44, C. 12, L. l. 75.

Length of head $4\frac{1}{4}$, height of body $2\frac{1}{8}$ in the total length. *Eyes*—small, the upper slightly in advance of the lower, and 1 diameter apart. Jaws of about equal length. No tentacles on the head. *Fins*—most of the rays of the vertical fins branched, the highest in the dorsal being two-thirds the length of the head: right ventral slightly longer than the eye, and continuous with the anal. Left pectoral absent. Caudal rounded. *Scales*—strongly ctenoid. *Colours*—brownish, the vertical fins being darker.

Habitat.—Madras, from whence the late Dr. T. C. Jerdon sent one specimen (22 lines long) to the British Museum.

Genus, 6—Achirus, (sp. *Lacépède) Cuvier.*

Pardachirus, Günther.

Branchiostegals six. Gill-openings narrow, the membranes being broadly united below the throat: gill-rakers rudimentary. Eyes on the right side, the upper in advance of the lower. Mouth narrower on the left side. Teeth minute and only on the blind side. The dorsal fin commences on the snout and ends close to the root of, but is not confluent with, the caudal: each dorsal and anal ray scaly, and generally with a pore at the base of each. Two ventrals, united to the anal. Pectorals absent. Scales small, cycloid or very partially or distinctly ctenoid. Lateral-line straight, on the blind side there are two, the upper commencing at the snout passes along the upper profile of the neck.

Geographical distribution.—From the Red Sea through the seas of India to the Nicobars and Malay Archipelago.

SYNOPSIS OF SPECIES.

1. *Achirus pavoninus*, D. 64-70, A. 50-56, L. l. 90-100. Some of the scales on the front of the body and head feebly ctenoid. Grayish-brown, covered with milk-white spots, some of which have a black dot in the centre. Andamans, Malay Archipelago and beyond.
2. *Achirus maculatus*, D. 56, A. 43, L. l. 65. Scales strongly ctenoid. Spotted with brown. Tranquebar.

1. Achirus pavoninus, Plate XCIII, fig. 2.

Achirus pavoninus, Lacép. iv, pp. 658, 661; Cantor, Catal. p. 225; Bleeker, Verh. Bat. Gen. xxiv, Pleur. p. 18, and Atl. Ich. Pleur. p. 24, t. 241, f. 1; Kaup, Uebers. Solein. Arch. Naturg. xxiv, i, p. 102.
Pleuronectes pavoninus, Shaw, Zool. iv, p. 310.
Achirus maculatus, (Kuhl. and v. Hass.) Bleeker, Pleur. p. 18.
Pardachirus pavoninus, Günther, Catal. iv, p. 479.
Solea (Pardachirus) pavonina, Steind. Fisch. Sing. 1870, p. 570.

B. vi, D. 64-70, V. (r.) 4 (l.) 5, A. 50-56, C. 15, L. l. 90-100.

Length of head $5\frac{1}{4}$ to $5\frac{2}{3}$, height of body $2\frac{1}{2}$ to 3 in the total length. *Eyes*—upper slightly in advance of the lower, diameter $5\frac{1}{2}$ in the length of the head, anterior edge of the lower eye $1\frac{1}{2}$ diameters from the end of snout. Angle of mouth below the first third of the lower eye. Numerous and rather long fringes along the edges of both upper and lower jaws, also on the left side of the head. *Fins*—an open pore at the base of each dorsal and anal ray on the left side. Anterior dorsal and anal rays branched. *Scales*—ctenoid on the head and anterior portion of the body. *Colours*—right side grayish-brown, covered with milk-white spots of various shapes and sizes, each having a black outer edge and some a central black dot.

Achirus marmorata, Lacép. is similar but distinguished by having only cycloid scales. It has been recorded from the Nicobars by Kner.

Habitat.—Andamans to the Malay Archipelago and beyond. The specimen figured (life-size) was from Port Blair.

2. Achirus maculatus.

Pleuronectes maculatus, Bl. Schn. p. 157.

D. 56, V. 6, A. 43, C. 15, L. l. 65.

Length of head $4\frac{1}{3}$, of caudal $5\frac{3}{4}$, height of body $2\frac{1}{2}$ in the total length. *Eyes*—rather small, diameter 9 in the length of head, the upper slightly in advance of the lower, and 2/3 of a diameter apart. Height of head 1/4 more than its length. Rostral hook covers the symphysis. Angle of mouth at junction of anterior third of head with the middle third. Lower lip fringed. Being a skin it is impossible to say if there were fringes on the head, or the character of the nostrils. *Teeth*—minute ones present on the blind side. *Fins*—dorsal commences on the snout, most of its rays appear to be branched, the highest in the posterior third of the body and equal to 1/3 of the greatest height of the body. Pectorals absent. Both ventrals present, the right equal to 1/3 of the length of the head. Vertical fins reach the root of the rounded caudal, but are distinct from it. *Scales*—strongly ctenoid, densely covering the dorsal and anal rays on both sides: a pore* at the base of each ray on the blind side. *Lateral-line*—straight. *Colours*—slaty-brown on the right side, with numerous dark blotches, and some vertical black lines crossing the lateral-line at a right angle.

* The skin is so covered with varnish that I am not quite clear on this point, but it appears to me that such are visible.

Head appears to have been marked as in *A. pavoninus.* Blind side of the body yellowish with scattered black blotches.

This fish evidently cannot be *A. pavoninus,* the strongly cteuoid character of its scales more resembles what is seen in Genus *Solea* than in *Achirus,* and it must be closely allied to *A. poropterus,* Kaup.

Habitat.—Tranquebar, from whence Bloch received the specimen described (6·5 inches in length) and for the opportunity of examining which I am indebted to Professor Peters of Berlin.

Genus, 7—Synaptura, *Cantor.*

Brachirus, Swains.: *Achiroides,* Bleeker: *Æsopia, Euryglossa,* and *Eurypleura,* Kaup.

Branchiostegals six. Body oblong or oval. Eyes on the right side, the upper in advance of the lower. Cleft of the mouth narrow, twisted round to the left side: the lips fimbriated or entire: minute teeth on the left side only: palate edentulous. One of the nostrils on the blind side dilated in some species, not so in others, whilst amongst the latter both pectorals may be present, the right being somewhat the longer, some of which have the nasal tube small and simple (Synaptura), or bifid (Euryglossa). Secondly, the left pectoral may be longer than the right (Anisochirus). Thirdly, the left pectoral may be rudimentary (Æsopia). Fourthly, both pectorals may be absent (Achiroides). Vertical fins confluent. Scales ctenoid (cycloid in S. cornuta), small. Lateral-line straight.

Geographical distribution.—From Beloochistan, through the seas of India to the Malay Archipelago and beyond.

SYNOPSIS OF SPECIES.

A. *Both pectoral fins present, the right the longer.*

1. *Synaptura Commersoniana,* D. 71-81, A. 61-63, L. l. 155. Two tubular nostrils on the coloured side. Leaden gray, vertical fins with a white margin. Seas of India to the Malay Archipelago.

2. *Synaptura albomaculata,* D. 72-74, A. 56-59, L. l. 110-120. Two tubular nostrils on the coloured side, with a short barbel intermediate. Brown, with 5 rows of widely separated white spots. Fins slate-coloured edged with white. Seas of India.

3. *Synaptura Orientalis,* D. 61-65, A. 47-52, L. l. 70-85. Scales on nape not enlarged. Slate-coloured, with black blotches, and fine black vertical lines crossing the lateral-line at right angles. Seas of India to China.

4. *Synaptura pan,* D. 57, A. 43, L. l. 80. Scales on nape enlarged. Colours as in *S. Orientalis.* Estuaries and tidal rivers from Orissa and Bengal to the Malay Archipelago.

B. *Left pectoral fin rudimentary.*

5. *Synaptura multifasciata,* D. 93, A. 67, L. l. 110. Nasal tube longer than the diameter of the eye. Head and body with 27 narrow cross-bands. East Indies.

6. *Synaptura cornuta,* D. 69-75, A. 61-62, L. l. 90-100. First dorsal ray thickened and prolonged. Thirteen vertical chestnut bands. Coromandel coast of India.

7. *Synaptura zebra,* D. 65-74, A. 58-60, L. l. 90-95. No prolonged dorsal ray. Ten reddish-chestnut vertical bands. Seas of India.

A. *Both pectorals present, the right the longer.*

1. Synaptura Commersoniana, Plate XCIV, fig. 1.

Pleuronectes Commersonianus, Lacép. iii, pl. 12, f. 32 (not iv, p. 656).
Pleuronectes, Russell, Fish. Vizag. i, p. 55, and *Jerree-potoo* A, pl. 70.
? *Solea Commersoniana,* Cuv. Règ. Anim.
Brachirus Commersoniana, Swainson, Fishes, ii, p. 303.
Synaptura Commersoniana, Cantor, Catal. p. 222; Bleeker, Beng. en Hind, p. 76, and Atl. Ich. Pleur. p. 18, t. 235, f. 3; Jerdon, M. J. L. and Sc. 1851, p. 148; Günther, Catal. iv, p. 483.
Solea Russellii, Bleeker, Verh. Bat. Gen. xxiv, Pleur. p. 15.
Synaptura Russellii, Bleeker, Beng. en Hind. p. 76.

Erumi naak, Tam.

B. vi, D. 70-81, P. 9, V. 4, A. 60-63, C. 12, L. l. 155-160.

Length of head 6 to $6\frac{1}{2}$, height of body $3\frac{2}{3}$ to 4 in the total length. *Eyes*—the upper almost entirely in advance of the lower, diameter $7\frac{1}{2}$ in the length of the head, nearly 1/2 a diameter apart, and $1\frac{1}{4}$ from the end of snout. Height of head rather more than its length. Upper jaw slightly the longer: angle of the mouth below the middle of the lower eye. Two tubular nostrils in front of the lower eye. *Scales*—strongly ctenoid on the coloured side. *Colours*—leaden-gray, vertical fins black with a broad white outer edge.

Habitat.—Seas of India to the Malay Archipelago: it attains at least 12 inches in length. It is not esteemed as food in Madras or along the Malabar Coast.

2. Synaptura albomaculata, Plate XCIII, fig. 5.

Kaup, Wiegm. Arch. 1858, p. 98 : Günther, Catal. iv, p. 483.

B. vi, D. 72-74, P. 7-8, V. 4, A. 56-59, C. 16, L. l. 110-120.

Length of head $5\frac{1}{2}$ to 6, height of body $3\frac{1}{3}$ to $3\frac{2}{3}$ in the total length. *Eyes*—of moderate size, the upper half in advance of the lower. Height of head 1/3 more than its length. Angle of mouth below the hind third of the eye. Lips on coloured side fringed. Two tubular nostrils on the coloured side. *Barbels*—a short one between the two nostrils. *Fins*—pectoral on coloured side $2\frac{3}{4}$ in the length of the head, very small on blind side. *Scales*—ctenoid on coloured, cycloid on blind side. *Lateral-line*—single on either side. *Colours*—body brown on the coloured side, with three to five rows of widely separated white dots. Fins slate-coloured edged with white.

Habitat.—Seas of India: attaining at least 12 inches in length. The specimen figured, life-size, was from Madras.

3. Synaptura Orientalis, Plate XCIII, fig. 4, and Plate XCIV, fig. 2.

Pleuronectes Orientalis, Bl. Schn. p. 157 (not Kaup. Wieg, Arch. 1858, p. 99: or Günther, Catal. iv, p. 484.)
Brachirus Orientalis, Swainson, Fishes, ii, p. 303.
Solea foliacea, Richardson, Ich. China, p. 279.
? Solea ovalis, Richardson, l. c.
Solea pan, Bleeker, Nat. Tyd. Ned. Ind. i, p. 410 (not Ham. Buch.)
Synaptura pan, Bleeker, Pleur. p. 30 (not H. B.)
Synaptura foliacea, Günther, Catal. iv, p. 481, Day, Fish. Malabar, p. 173.
Synaptura cinerascens, Günther, l. c. p. 482 ; Kner, Novara Fische, p. 291.
Brachirus Sundaicus, Bleeker, Atl. Ich. Pleuron. p. 20, t. 236. fig. 4 and t. 239, f. 2.

Sappatee, Mal.

B. vi, D. 62-65, P. 7, V. 5, A. 47-50, C. 16, L. l. 70-85.

Length of head 5 to $5\frac{1}{6}$, of caudal $8\frac{1}{2}$, height of body $2\frac{1}{3}$ to $2\frac{1}{6}$ in the total length. *Eyes*—the upper one slightly in advance of the lower, and 2/3 to 1 diameter apart. The upper jaw rather overlapping the lower. No dilated nostril on the blind side: nasal tube on coloured side, simple. *Fins*—the right pectoral longer than the left, and $2\frac{2}{3}$ to 3 in the length of the head. Dorsal commences on the snout, its rays are branched at their extremities, it extends 2/3 up the length of the caudal. Ventral not adherent to the anal. *Scales*—ctenoid on both sides. Lips on blind side and head with numerous short cutaneous filaments, some are also present on the coloured side of the body and are generally black. *Colours*—of a bluish slate colour on the right side, usually with short narrow black vertical bands crossing the lateral line: the body is likewise blotched with darker sometimes as spots, in other instances in bands, occasionally some white marks. Vertical fins dark, outer half of pectoral black. The scales on the head and first-third of the length of this fish are usually smaller than those posterior to them along the lateral line and above and below it.

This fish may be at once distinguished from *S. pan*, because the latter has an enlarged row of scales over the nape.

I have to thank Professor Peters of Berlin, for permitting me to examine the type specimen of *Pleuronectes Orientalis*, Bl. Schn. which is this species, it has D. 64, A. 48, L. l. 85.

Habitat.—Sind, western coast of India, Andamans, China seas. The specimens figured are from Canara. I have a specimen from Singapore, from whence it was brought by the late Dr. Stoliczka.

4. Synaptura pan, Plate XCIII, fig. 3.

Pleuronectes pan, Ham. Buch. Fish. Ganges, pp. 130, 373, pl. 24, f. 42.
Brachirus pan, Swainson, Fishes, ii, p. 303; Bleeker, Atl. Ich. Pleur. p. 21, t. 240, f. 1.
Pleuronectes canus, Gronov. ed. Gray, p. 91.
Pleuronectes pan, Bleeker, Beng. en Hind. p. 76, and Pleur, p. 30 (not synon).
Synaptura pan, Günther, Catal. iv, p. 481.

B. vi, D. 57-60, P. 7, V. 6, A. 43-45, C. 14, L. l. 80.

Length of head 5, height of body $2\frac{1}{2}$ in the total length. *Eyes*—upper slightly in advance of the lower, diameter 6 in length of head, 2 diameters from the end of snout, and scarcely 1 apart. Height of head 1/4 more than its length. The upper jaw slightly overlaps the lower. The maxilla reaches to below the first third of the eye. Two nostrils, a patent one in front of lower eye, and a tubular one just anterior to it: nostril on blind side concealed. Lower lip slightly fringed on the coloured side. *Fins*—the posterior dorsal and most of the anal rays branched. Right pectoral $2\frac{1}{3}$ in the length of the head, and much longer than the left, which consists of six rays. *Scales*—strongly ctenoid on both sides. The scales from above the eye to the nape and in a wide band crossing the nape are much larger than those on the remainder of the body: vertical fins rather densely scaled. *Lateral-line*—straight. *Colours*—of a dull red or muddy brown or gray, with irregular vertical black blotches and bands: right pectoral black.

Bleeker gives L. l. 100, being more than I find in Indian or Burmese examples.

Habitat.—estuaries and tidal rivers of Orissa, lower portion of the Ganges, Burmese rivers and Malay Archipelago, attaining about 6 inches in length. The one figured was from Calcutta.

B. *Left pectoral fin rudimentary.*

5. Synaptura multifasciata.

Æsopia multifasciata, Kaup, Wiegm. Arch. 1858, p. 97.
Synaptura multifasciata, Günther, Catal. iv, p. 485.

B. vi, D. 93, P. 7-10, A. 67, L. l. 110.

Length of head 7, height of body 3 in the total length. *Eyes*—placed close together. Nasal tube longer than the diameter of the eye. *Fins*—two longest pectoral rays exceed the diameter of the lower eye. *Colours*—head and body with twenty-seven narrow cross-bands.

Habitat.—East Indies. This fish may be a reversed *Solea heterorhina* (see p. 426).

6. Synaptura cornuta, Plate XCIV, fig. 4.

Pleuronectes, Russell, Fish. Vizag. i, p. 56, and *Jerree-potoo*, pl. 72.
Solea cornuta, Cuv. Règ. Anim.
Synaptura potoo, Bleeker, Beng. en Hind. p. 76.
Æsopia cornuta, Kaup, Wiegm. Arch. 1858, p. 95; Günther, Catal. iv, p. 487; Day, Proc. Zool. Soc. 1873, p. 238.

B. vi, D. 69-75, P. 17, V. 3-4, A. 61-62, C. 17, L. l. 90-100.

Length of head 6, height of body $3\frac{1}{3}$ in the total length. *Eyes*—diameter 4 to $4\frac{1}{2}$ in the length of head, scarcely 1 diameter from end of snout, and placed close together: the upper eye is scarcely, if at all, in advance of the lower. Angle of the mouth below the middle of the eye. A few short filaments along the lower edge of the mandible. A round nostril in front of the lower eye, and anterior to it a tubular one. *Teeth*—some fine ones on the blind side. *Fins*—pectoral on the coloured side rather longer than the one on the blind side, but both very short.* First dorsal ray thickened and prolonged, the next few rays lower than the succeeding ones. *Scales*—cycloid on both sides. *Lateral-line*—single on both sides. *Colours*—twelve to thirteen vertical chestnut bands on a light ground colour, the anterior of which is on the snout, they are continued on to the vertical fins. Caudal dark, with white markings, dorsal having a white edge.

Habitat.—Coromandel coast: attaining at least 6 inches in length.

7. Synaptura zebra, Plate XCIV, fig. 3.

Pleuronectes zebra, Bl. t. 187; Gmel. Lin. p. 1226; Bl. Schn. p. 151.
Pleuronectes, Russell, Fish. Vizag. i, p. 56, and *Jeree-potoo* B, pl. 71.
Solea jerreus, Cuv. Règ. Anim.
Brachirus jerreus, Swainson, Fishes, ii, p. 303.
Æsopia quagga, Kaup, in Wiegm. Arch. 1858, p. 98.
Synaptura jerreus, Bleeker, Beng. en Hind. p. 76; Jerdon, M. J. L. and Sc. 1851, p. 148.
Synaptura quagga, Günther, Catal. iv, p. 485.
Varri amler, Tam.

B. vi, D. 65-74, P. 6, V. 5, A. 58-60, C. 16-18, L. l. 90-95.

Length of head 6, height of body 3 in the total length. *Eyes*—close together, the anterior third of the upper being in advance of the lower, diameter $4\frac{1}{2}$ in the length of head, the lower about 1 diameter from the end of snout. Head 1/4 higher than long. Jaws of about equal length anteriorly. Angle of the mouth below the first third of the lower eye. Two nostrils in front of lower eye, the anterior being tubular. *Barbels*—in some, not all specimens, there is a barbel above either eye, occasionally it is short, but in some examples it equals the diameter of the eye. *Fins*—pectorals attached to the gill-covers, the upper two rays on the right side longer than the others: left pectoral rudimentary. *Scales*—ctenoid. *Colours*—grayish-brown, with ten reddish-brown vertical bands, commencing on the dorsal and continued on to the anal fin, where they become nearly black: pectoral on the right side nearly black: caudal black, with some irregular white markings towards its edges.

I have convinced myself by examining Bloch's type specimen (most kindly lent to me by Professor Peters) that this is his fish, others have considered a Malay Archipelago or a Chinese fish was intended, and it has been described as having D. 77-89, A. 66-79, C. 13-15, L. l. 125-130 and the same colours as *S. zebra*, Bl.

Kaup suggested that *Synaptura multifasciatus*, *Japonicus*, *zebra*, and the species here described may be varieties of one species.

Habitat.—Seas of India, including Ceylon and ? Chinese seas: attaining at least 6 inches in length,

* The pectorals were overlooked by Russell.

Genus, 8—Plagusia, pt. *Cuvier.*

Paraplagusia, Bleeker.

Branchiostegals six. Gill-openings very narrow. Eyes on the left side. Anterior portion of snout prolonged and curving downwards and backwards in the form of a hook which covers the mandible. Mouth rather narrow and unsymmetrical: lips on the coloured side fringed. A single nostril on the left side before the angle of the lower eye, but none in the interorbital space. Vertical fin confluent. Pectorals absent. Scales ctenoid, small. Lateral-line on the coloured side, double or triple.

Geographical distribution.—Red Sea and east coast of Africa, through the seas of India, to the Malay Archipelago and beyond.

SYNOPSIS OF SPECIES.

1. *Plagusia marmorata*, D. 99-106, A. 75-86, L. l. 90-100. Two lateral-lines on the left-side separated by 16 or 17 rows of scales. East coast of Africa, seas of India, to China.

2. *Plagusia bilineata*, D. 96-102, A. 70-74, L. l. 84-94. Two lateral-lines on the left side separated by 13 or 14 rows of scales. Red Sea, seas of India, to the Malay Archipelago.

1. Plagusia marmorata, Plate XCV, fig. 1.

Bleeker, Nat. Tyds. Ned. Ind. i, p. 411, Pleuronec. p. 20; Günther, Catal. iv, p. 491; Kner, Novara Fische, p. 293.

Paraplagusia marmorata, Bleeker, Atl. Ich. Pleur. p. 28, t. 246, f. 5.

Nah-lah-ku, Tamil.

B. vi, D. 99-106, V. 4, A. 75-86, C. 10, L. l. 90-100.

Length of head $4\frac{1}{4}$ to $4\frac{1}{3}$, height of body $3\frac{2}{3}$ to 4 in the total length. *Eyes*—small, the upper in advance of the lower, they are placed in the middle of the length of head, nearly 1 diameter apart. Lips fringed. The rostral hook reaches to some distance beyond the posterior edge of the lower orbit. Angle of mouth below the hind edge of the eye and nearer the hind edge of the opercle than the snout. A tubular nostril in front of lower eye: nostril developed on the blind side. *Fins*—a single ventral. *Scales*—ctenoid. *Lateral-lines*—two on the left side separated by 16 or 17 rows of scales, and one on the right side. *Colours*—brownish, finely marbled with darker.

Habitat.—East coast of Africa, seas of India to China. The specimen figured was from Madras.

2. Plagusia bilineata.

Pleuronectes bilineatus, Bloch, t. 188; Gmel. Linn. p. 1235; (not Bl. Schn.* p. 158) Russell, Fish. Vizag. i, p. 58, and *Jerree-potoo*, pl. 74; Bennett, Life of Sir S. Raffles, p. 692.

Plagusia dipterygia, Rüpp. Atl. Fische, p. 123, t. 31, f. 3, and N. W. F. p. 84.

Plagusia bilineata, Cuv. Règ. Anim.; Swainson, Fishes, ii, p. 303; Cantor, Catal. p. 227; Jerdon, M. J. L. and Sc. 1851, p. 148; Günther, Catal. iv, p. 492; Day, Fish. Malabar, p. 174; Klunz. Verh. z. b. Ges. Wien, 1871, p. 573.

Plagusia Blochii, Bleeker, Pleur. p. 21, and Nat. Tyds. Ned. Ind. i, p. 411.

Paraplagusia marmorata, Bleeker, Atl. Ich. Pleuron. p. 27, t. 244, f. 5.

Aralu, Tamil.

B. vi, D. 96-102, V. 4, A. 70-74, C. 8, L. l. 84-94.

Length of head $4\frac{1}{6}$, height of body $3\frac{2}{3}$ in the total length. *Eyes*—diameter 8 to 12 in the length of head, 1 diameter apart, the upper in advance of the lower, and the two occupying the middle of the length of the head. Height of head equals 8/9 of its length. Angle of the mouth considerably nearer gill-opening than to the end of the snout, the rostral hook extends to below the hind edge of the lower eye. A single tubular nostril on the coloured side in front of the lower eye and close to the lip. A well-developed tubular nostril on the blind side. *Fins*—a single ventral attached to the anal. *Scales*—ctenoid. *Lateral-line*—two on the coloured side separated by thirteen or fourteen rows of scales: a single lateral-line on the blind side. *Colours*—opercle tinged with bluish-black: each scale on the body lightest in its centre: fins dull orange.

Habitat.—Red Sea, seas of India to the Malay Archipelago. It attains at least 10 inches in length, and is good eating.

Genus, 9—Cynoglossus,† *Hamilton Buchanan.*

Cantoria, Arelia, Trulla, Icania, Kaup.

Branchiostegals six. Gill-openings very narrow. Eyes on the left side. Anterior portion of snout prolonged.

* Bl. Schn. says of *P. arel*, p. 159, "Narium foramine superiore inter oculos minores, quam in bilineato, inferiore ante oculum inferiorem," evidently showing the presence of two nostrils in the species which he described.

† Dr. Günther observes *Cynoglossus* et *Achirus* H. B. I am unable to find the former name employed by H. B. except as a specific term.

and curves downwards and backwards in the form of a hook. Mouth rather narrow and unsymmetrical. Lips not fringed. There may be two nostrils on the coloured side, one of which is in the interorbital space (Arelia); or two nostrils before the lower eye, the inferior of which is broader than the superior one (Cantoria); or only one nostril which is in front of the lower eye (Trulla); or no conspicuous nostril (Icania). Minute teeth on the right side only. Vertical fins confluent: pectorals absent. Scales ctenoid or cycloid. Lateral-line on the coloured side double or triple.

Geographical distribution.—Tropical seas, some are found in tidal rivers, and are said to enter fresh-water.

SYNOPSIS OF SPECIES.

A. *Three lateral-lines on the coloured side.*

1. *Cynoglossus quinquelineatus*, D. 109, A. 91, L. l. 100. An open nostril between the eyes, a tubular one before the lower eye. Scales ctenoid on coloured side only, 17 rows between upper and middle lateral-lines, 15 between middle and lower. Opercle black. Madras.

B. *Two lateral-lines on the coloured side: a patent nostril between the eyes, a tubular one before lower orbit.*

2. *Cynoglossus lingua*, D. 142-150, A. 105-110, L. l. 100-115, L. tr.* 13. Scales feebly ctenoid, and on the coloured side only: one lateral-line on the blind side. Seas and estuaries of India to the Malay Archipelago and beyond.

3. *Cynoglossus elongatus*, D. 137-140, A. 107-110, L. l. 95-110, L. tr. 8. Scales cycloid on both sides. One lateral-line on the blind side. Madras, Pinang.

4. *Cynoglossus oligolepis*, D. 118-129, A. 91-95, L. l. 65-75, L. tr. 8-9. Scales ctenoid on the coloured side only. One lateral-line on the blind side. Seas of India to the Malay Archipelago.

5. *Cynoglossus macrolepidotus*, D. 116-118, A. 86-90, L. l. 50-55, L. tr. 6-7. Scales ctenoid on the coloured side only. One lateral-line on the blind side. Seas of India to the Malay Archipelago.

6. *Cynoglossus Sindensis*, D. 106-116, A. 83, L. l. 108, L. tr. 19-20. Angle of mouth in middle of length of head. Scales ctenoid on coloured side only. Two lateral-lines on the blind side. Sind, through seas of India.

7. *Cynoglossus arel*, D. 104-114, A. 85, L. l. 95, L. tr. 7. Scales ctenoid on coloured side only: a single lateral-line on the blind side.

8. *Cynoglossus dispar*, D. 109-112, A. 90-94, L. l. 110-115, L. tr. 18-19. Angle of mouth in front half of head. Scales ctenoid on coloured side only. Two lateral-lines on the blind side. Seas of India.

9. *Cynoglossus dubius*, D. 110, A. 88, L. l. 21. Scales cycloid on both sides. Two lateral-lines on the blind side. Beloochistan and Sind.

10. *Cynoglossus quadrilineatus*, D. 107, A. 80-88, L. l. 14-15. Scales ctenoid on the coloured side only. Two lateral-lines on the blind side. Seas of India to the Malay Archipelago.

11. *Cynoglossus brachyrhynchus*, D. 106, A. 78, L. l. 90-94, L. tr. 17-18. Scales ctenoid on both sides. A single lateral-line on the blind side. Estuaries of Bengal and Burma to the Malay Archipelago.

12. *Cynoglossus Bengalensis*, D. 101-103, A. 78-80, L. l. 90-95, L. tr. 13-14. Height of body $3\frac{1}{2}$ to $3\frac{3}{4}$ in the total length. Snout 2/5 of length of head. Scales ctenoid on both sides. A single lateral-line on the blind side. Hooghly at Calcutta.

13. *Cynoglossus Hamiltonii*, D. 101, A. 76, L. l. 105, L. tr. 15-16. Scales ctenoid on both sides. A single lateral-line on the blind side. Hooghly.

14. *Cynoglossus lida*, D. 99-104, A. 75-83, L. l. 90, L. tr. 13. Height of body 4 to $4\frac{2}{3}$ in the total length. Scales ctenoid on both sides. A single lateral-line on the blind side. Burma to the Malay Archipelago.

15. *Cynoglossus semifasciatus*, D. 98-103, A. 75-80, L. l. 85, L. tr. 12-13. Snout 2/7 of length of head. Scales ctenoid on both sides. A single lateral-line on the blind side. Madras.

16. *Cynoglossus puncticeps*, D. 94-100, A. 74-80, L. l. 95-100, L. tr. 16-17. Snout 1/3 of length of head. Scales ctenoid on both sides. A single lateral-line on the blind side. Seas of India to the Malay Archipelago.

17. *Cynoglossus brevis*, D. 95, A. 70-75, L. l. 96, L. tr. 17-18. Scales ctenoid on both sides. A single lateral-line on the blind side. Hooghly at Calcutta.

18. *Cynoglossus brevirostris*, D. 91, A. 76, L. l. 78, L. tr. 10. Scales ctenoid on both sides. A single lateral-line on the blind side. Madras.

A. *Three lateral-lines on the coloured side.*

1. Cynoglossus quinquelineatus, Plate XCVIII, fig. 1.

B. vi, D. 109, V. 4, A. 91, C. 13, L. l. 100.

Length of head $5\frac{1}{3}$, height of body 4 in the total length. *Eyes*—diameter $9\frac{1}{2}$ in the length of head, about 4 from the end of snout, and 1 apart: the upper slightly in advance of the lower. Height of the head equals its length. The maxilla reaches to rather behind the hind edge of the lower orbit, and is situated rather nearer to the gill-opening than to the end of the snout. Two nostrils, a patent one between the orbits, and a

* By L. tr. is here understood the greatest number of rows of scales between the two lateral-lines on the left or coloured side.

tubular one in front of lower eye: one on the blind side not concealed. *Fins*—a single ventral adherent to the anal. *Scales*—ctenoid on coloured, cycloid on blind side. *Lateral-lines*—three on the coloured side, the upper and middle separated at their greatest distance by seventeen rows of scales, the middle and lower ones by fifteen. Two lateral-lines on the blind side. *Colours*—brownish, opercles black.

Habitat.—Madras. A single specimen 10 inches long.

2. Cynoglossus lingua, Plate XCVI, fig. 1.

Pleuronectes, Russell, Fish. Vizag. i, p. 57, and *Jerree-potoo* D. pl. 73.
Cynoglossus lingua, Ham. Buch. Fish. Ganges, pp. 32, 365; Günther, Catal. iv, p. 501.
Plagusia potous, Cuv. Règ. Anim.; Bleeker, Beng. en Hind. p. 762, Pleur. p. 23 (not Cantor.); Jerdon, M. J. L. and Sc. 1851, p. 148.
Plagusia lingua, Jerdon, M. J. L. and Sc. 1851, p. 148.
? *Arelia lingua*, Kaup, Uebers. Plagus. Arch. Nat. xxiv, i, p. 107.
Arelia potous, Bleeker, en pisc. p. 185 (not Kaup.)
Cynoglossus macrorhynchus, Kner, Novara Fische, p. 295.
Cynoglossus potous, Bleeker, Atl. Ich. Pleur. p. 33, t. 241, fig. 4.
Kot-aralu, Tam.

B. vi, D. 142-150, V. 4, A. 105-110, C. 8, L. l. 100-115.

Length of head $4\frac{3}{4}$ to 5 or even $5\frac{1}{2}$, of caudal 16, height of body 6 to $6\frac{1}{2}$ in the total length. *Eyes*—diameter 12 to 14 in the length of the head, they are situated in about the middle of the length of the head, the upper slightly in advance of the lower, and about 1 diameter apart. The greatest height of the head equals 2/3 of its length. The cleft of the mouth extends to a short distance behind the posterior edge of the eyes: rostral hook reaches to below the front edge or even posterior margin of the eyes: lips not fringed. Two nostrils, a patent one between the eyes and a tubular one over the upper lip. *Scales*—very feebly ctenoid on the coloured side and only in their centre: cycloid on the uncoloured side. *Lateral-lines*—two on the left or coloured side, divided at their greatest distance by thirteen rows of scales: on the uncoloured side the lateral-line is very indistinct. *Colours*—reddish-brown on the coloured side, sometimes with some cloudy markings, generally lineated: opercles nearly black.

This is the largest of the marine and estuary species in India, and the most esteemed for the table. Bleeker gives a few less rays, D. 132-133, A. 102-103, L. l. 90-95. In his paper Beng. en Hind. he, correctly as I think, identified Ham. Buch. and Russell's fish.

Habitat.—Seas and estuaries of India: attaining at least 18 inches in length. The specimen figured was from Calcutta.

3. Cynoglossus elongatus, Plate XC, fig. 5.

Cynoglossus lingua, Cantor, Catal. p. 233, (not Ham. Buch.)
Cynoglossus elongatus, Günther, Catal. iv, p. 501; Bleeker, Atl. Ich. Pleuron. p. 34.

B. vi, D. 137-140, V. 4, A. 107-110, C. 10, L. l. 95-110.

Length of head $4\frac{3}{4}$, height of body $6\frac{1}{2}$ in the total length. *Eyes*—small, the upper in advance of the lower, diameter 11 in the length of head, 4 diameters from end of snout, and placed close together. Height of head 2/3 of its length. Angle of the mouth behind the hind edge of the eye, and nearer the gill-opening than the snout. Lips not fringed. Length of snout $2\frac{1}{3}$ in that of the head. Rostral hook reaches to below the mandibular symphysis. Two nostrils, a patent one between the eyes and a tubular one before the lower orbit. *Fins*—a single ventral attached to the anal. Günther observes "both ventrals are present?" *Scales*—cycloid on both sides. *Lateral-lines*—two on the coloured side divided at their greatest distance by eight rows of scales: one on the blind side. *Colours*—reddish-brown, opercle with a dark band: vertical fins with a black outer edge.

Habitat.—Madras and Pinang. The specimen (figured life-size) was from Madras.

4. Cynoglossus oligolepis, Plate XCV, fig. 4.

Plagusia oligolepis, Bleeker, Java, p. 445.
Arelia oligolepis, Bleeker, En. Spec. p. 185.
Cynoglossus oligolepis, Günther, Catal. iv, p. 496; Bleeker, Atl. Ich. Pleur. p. 34, t. 242, f. 5.

B. vi, D. 118-129, V. 4, A. 91-95, C. 12, L. l. 65-75.

Length of head $4\frac{3}{4}$, height of body $5\frac{1}{4}$ in the total length. *Eyes*—small, situated just before the middle or in the commencement of the anterior half of the head, the upper being half in advance of the lower, 3/4 of a diameter between the two. Height of head equals 4/5 of its length. A patent nostril between the eyes and a tubular one before the lower eye above the lip. Angle of mouth 1/4 of a diameter of the orbit behind the lower eye. Rostral hook reaches to below the front edge of the lower eye. Lips not fringed. Snout 2/5 of the length of the head. *Fins*—vertical fins comparatively low: only the left ventral present, and not connected to the commencement of the anal. *Scales*—ctenoid on the coloured, cycloid on the blind side. *Lateral-lines*—

two on the left side, separated at their greatest distance by 8 or 9 rows of scales, one on the blind side: 60 rows of scales along the blind side of the body. *Colours*—of a rich brown on the coloured side without any markings.

Habitat.—Seas of India to the Malay Archipelago.

5. **Cynoglossus macrolepidotus,** Plate XCVI, fig. 3.

Plagusia macrolepidota, Bleeker, Pleuron. p. 25, and Nat. Tyds. Ned. Ind. p. 415.

Arelia macrolepidota, Bleeker, En. Spec. p. 184.

Cynoglossus macrolepidotus, Günther, Catal. iv, p. 496; Kner, Novara Fische, p. 294; Bleeker, Atl. Ich. Pleuron. p. 34, t. xi, f. 2.

B. vi, D. 116-118, V. 4, A. 86-90, C. 11, L. l. 50-55.

Length of head $4\frac{1}{3}$ to $4\frac{2}{3}$, height of body $4\frac{1}{2}$ to $4\frac{3}{4}$ in the total length. *Eyes*—small, diameter 14 to 15 in the length of head, 4 to $4\frac{1}{2}$ diameters from end of snout and 1 diameter apart. The length of the head a little exceeds it greatest height. Rostral hook short. Lips not fringed. Angle of the mouth in the middle of the length of the head. Two nostrils on coloured side, a patent one between the eyes anteriorly, and a tubular one before the lower orbit. *Fins*—rays unbranched. *Scales*—ctenoid on coloured, cycloid on blind side. *Lateral-lines*—two on right side separated by 6 or 7 rows of scales at their greatest distance asunder, one lateral-line on the blind side. *Colours*—Brownish, with an ill-defined bluish band along the bases of the dorsal and anal fins: a bluish blotch on opercles.

Habitat.—Seas and coasts of India to the Malay Archipelago. The specimen figured (8·2 inches long) was from Madras.

6. **Cynoglossus Sindensis,** Plate XC, fig. 6.

B. vi, D. 106-116, V. 4, A. 83, C. 12, L. l. 108.

Length of head 5, height of body $3\frac{3}{4}$ to 4 in the total length. *Eyes*—upper very slightly or not at all in advance of the lower, diameter $8\frac{1}{2}$ to $9\frac{1}{2}$ in the length of the head, 1 diameter apart, and 4 from the end of snout. Height of head rather exceeds its length. Rostral hook covers the symphysis of the lower jaw, but does not extend to below the front eye. Angle of mouth below the hind edge of the lower eye, and midway between the anterior edge of snout and gill-opening. Two nostrils, a small open one betwen the eyes, and a tubular one before the lower eye. *Scales*—strongly ctenoid on coloured, cycloid on blind side. *Lateral-lines*—two on either side, those on the coloured side separated by 19 or 20 rows of scales. *Colours*—dark leaden-brown on the coloured side with a large black blotch on the opercles.

This fish is near *C. Borneensis*, the latter, however, has only one lateral-line on the blind side. It differs from *C. dispar* in the situation of the angle of the mouth, &c.

C. trulla, Cantor, is said to have only a single nostril below the lower eye, and no remark is made respecting the number of lateral-lines on the blind side, but there is "a bony protuberance or spine" below the lower orbit.

Habitat.—From Sind through the seas of India: the largest specimen 18 inches long.

7. **Cynoglossus arel,** Plate XCVIII, fig. 2.

Pleuronectes arel, Bl. Schn. p. 159.

B. vi, D. 104-114, V. 4, A. 85, C. 12, L. l. 95.

Length of head $4\frac{3}{4}$, height of body 5 in the total length. *Eyes*—small, upper half in advance of the lower, 1 diameter apart: both eyes in the anterior half of the head. Height of head 1/4 less than its length. Rostral hook just covers the symphysis of the lower jaw. Angle of mouth upwards of one diameter behind the hind edge of the lower eye, and situated a little behind the middle of the length of the head. Two nostrils, a rather large open one between the eyes, and a tubular one above upper lip. *Scales*—slightly ctenoid on the coloured, cycloid on the blind side. *Lateral-lines*—two on the coloured side separated by 7 rows of scales, a single lateral-line on the blind side. *Colours*—brownish on the coloured side without markings.

This cannot be (as suggested by Dr. Günther) *Cynoglossus* or *Arelia kaupii*, Bleeker, as the latter has two lateral-lines on either side.

I am indebted to Professor Peters of Berlin for the use of one of Schneider's types, from which the above description and figure are taken.

Habitat.—Tranquebar.

8. **Cynoglossus dispar,** Plate XCVI, fig. 2.

B. vi, D. 109-112, V. 4, A. 90-94, C. 9, L. l. 110-115.

Length of head $5\frac{1}{2}$ to $5\frac{3}{4}$, height of body $3\frac{1}{2}$ to $3\frac{3}{4}$ in the total length. *Eyes*—diameter 9 to 11 in the length of head, 1/2 a diameter apart, and 3 from the end of snout: half of the upper eye being in advance of the lower one. Height of head 1/6 more than its length. Two nostrils, one patent between the eyes, the other tubular before the lower orbit. Lips not fringed, the rostral hook is extended a little distance beyond the mandibular symphysis. Angle of the mouth below the hind edge of the lower orbit, and much nearer the end of snout than the gill opening. *Fins*—ventral adherent to the anal. *Scales*—strongly ctenoid on the coloured,

cycloid on the blind side: eighteen or nineteen rows between the lateral-lines of the coloured side. *Lateral-lines*—two on either side, the upper on the blind side ceasing in about the last fourth of the body. *Colours*—brown, blotched all over with darker marks: fins yellowish, with numerous black spots.

This species differs from *C. brachyrhynchus* and *C. Borneensis*, each of which have only one lateral-line on the blind side.

Habitat.—Bombay, to $14\frac{1}{2}$ inches in length, also Madras.

9. Cynoglossus dubius, Plate XCV, fig. 2.

Day, Journ. Linn. Society, 1873, xi, p. 525.

B. vi, D. 110, V. 4, A. 88, C. 12, L. l. 104.

Length of head 4, height of body $3\frac{1}{3}$ in the total length. *Eyes*—diameter 20 in the length of head, $8\frac{1}{2}$ diameters from end of snout, and 2 apart: the upper very slightly in advance of the lower. Head 1/6 longer than high. Rostral hook just covers the symphysis. The maxilla extends to 1 diameter of the eye behind the lower orbit: angle of the mouth just behind the middle of the length of the head. *Fins*—highest dorsal and anal rays 1/6 of the height of the body. No right ventral, the left attached to the anal. *Scales*—cycloid on both sides. *Lateral-lines*—two on the coloured side separated at their greatest distance by twenty-one rows of scales: two lateral-lines on the blind side. *Colours*—brownish, with indistinct blotches on the body.

Habitat.—Sind and Beloochistan: the specimen figured, 20 inches long, was captured at Gwadur.

10. Cynoglossus quadrilineatus.

Achirus bilineatus, Lacép. iv, pp. 659, 663.
Plagusia bilineata, Rüpp. Atl. Fische, p. 123.
Plagusia quadrilineata, Bleek. Pleuron. p. 21, or Natuurk Tydschr. Nederl. Ind. i, p. 412.
Arelia quadrilineata, Kaup, in Wiegm. Arch. 1858, p. 107.
Cynoglossus quadrilineatus, Günther, Catal. iv, p. 427; Kner, Novara Fische, p. 295; Klunz. Verh. z. b. Ges. Wien, 1871, p. 573.

B. vi, D. 107, V. 4, A. 80-88, C. 12, L. l. 86.

Length of head 5 to $5\frac{1}{3}$, height of body 4 in the total length. *Eyes*—the upper slightly in advance of the lower, 9 or 10 diameters in the length of head, and 3 to $3\frac{1}{2}$ from the end of snout. The height of the head rather exceeds its length. Rostral hook just covers the symphysis of the lower jaw. The angle of the mouth is in about the middle of the length of the head. Two nostrils, an open one between the orbits, and a tubular one before the lower eye. *Fins*—a single ventral attached to the anal. *Scales*—ctenoid on the coloured, cycloid on the blind side. *Lateral-lines*—two on the left side separated by fourteen or fifteen rows of scales: two also on the blind side. *Colours*—brownish on the left side, a darkish blotch covering the opercles.

Habitat.—Sind, seas of India to the Malay Archipelago.

11. Cynoglossus brachyrhynchus, Plate XCVI, fig. 4.

Plagusia brachyrhynchus, Bleeker, Pleur. p. 24, and Nat. Tyds. Ned. Ind. i, p. 414.
Arelia brachyrhynchus, Bleeker, Enum. Spec. p. 184.
Cynoglossus brachyrhynchus, Günther, Catal. iv, p. 499; Bleeker, Atl. Ich. Pleur. p. 37, t. 243, fig. 4.

B. vi, D. 106, V. 4, A. 78, C. 12, L. l. 90-94.

Length of head $4\frac{3}{4}$, height of body $3\frac{3}{4}$ to 4 in the total length. *Eyes*—in the anterior half of the head, the upper slightly in advance of the lower, diameter 13 in the length of head, $4\frac{1}{2}$ diameters from the end of snout, about 1 apart. Head as high as long. Length of the snout equals 1/3 of length of head. Angle of the mouth slightly behind the posterior margin of the lower eye, and rather nearer the snout than the gill-opening. Rostral hook extends to in front of symphysis of the lower jaw. Two nostrils, a patent one between the eyes and a tubular one in front of the lower eye. *Fins*—no right ventral. Dorsal and anal fin-rays about 1/4 of the height of the body. *Scales*—ctenoid on both sides. *Lateral-lines*—two on the coloured side, separated by 17 or 18 rows of scales: a single one on the blind side. *Colours*—brown, irregularly marbled with darker, the opercle sometimes with a dark blotch.

Habitat.—Calcutta and Moulmein in brackish waters but within tidal reach, to the Malay Archipelago. The specimen figured (life-size) was from Moulmein.

12. Cynoglossus Bengalensis, Plate XCVII, fig. 4.

Plagusia Bengalensis, Bleeker, Beng. en Hind. p. 152, t. vi, f. 3.
Cynoglossus Bengalensis, Günther, Catal. iv, p. 499.

B. vi, D. 101-103, V. 4, A. 78-80, C. 12, L. l. 90-95.

Length of head 5, height of body $3\frac{1}{2}$ to $3\frac{3}{4}$ in the total length. *Eyes*—the upper very slightly in advance of the lower, diameter 10 or 11 in the length of the head, 3 to $3\frac{1}{2}$ diameters from end of snout and 1/2 a diameter apart. Head as high as long. Snout about 2/5 of length of head. Angle of the mouth below the middle or end of the lower orbit. Two nostrils, one patent between the eyes, the other tubular before the lower orbit. Rostral hook just covers symphysis. *Fins*—highest dorsal rays 4 in the height of the body. A single

ventral attached to the anal. *Lateral-lines*—two on the coloured side, separated at their greatest distance by 13 or 14 rows of scales: a single lateral-line on the blind side. *Scales*—ctenoid on both sides. *Colours*—stone colour, marbled with darker.

Habitat.—Hooghly at Calcutta.

In the Sittoung river in Burma is a very similar fish, D. 105, V. 4, A. 68, C. 15, L. l. 100. Length of head and height of body, each 5 in the total length. *Eyes*—small, contiguous, snout $2\frac{1}{4}$ in the length of head, angle of mouth nearer snout than gill-opening. Height of head equals its length. Rostral hook reaches to below the middle of the front eye. *Fins*—ventral not attached to anal. *Lateral-lines*—2 on coloured side divided by 14 rows of scales, 1 on blind side. *Scales*—ctenoid on both sides. *Colours*—brown, vertical fins spotted with black and black edged.

13. Cynoglossus Hamiltonii, Plate XCV, fig. 3.

Achirus cynoglossus, Ham. Buch. Fish. Ganges, pp. 132, 373.
? *Plagusia cynoglossa*, Cantor, Catal. p. 229; Bleeker, Beng. en Hind. p. 76.
? *Icania cynoglossa*, Kaup, Wiegm. Arch. 1858, p. 109.
? *Cynoglossus Hamiltonii*, Günther, l. c. Catal. iv. p. 504.
Cynoglossus Buchanani, Day, Proc. Zool. Soc. 1869, p. 522.

B. vi, D. 101, V. 4, A. 76, C. 10, L. l. 105.

Length of head $4\frac{1}{4}$, height of body $4\frac{1}{4}$ in the total length. *Eyes*—close together and small, 15 diameters in the length of head, the upper slightly in advance of the lower. Head slightly longer than high, snout $3\frac{1}{2}$ in length of head. Rostral hook does not cover the symphysis. The angle of the mouth is 1 diameter behind the lower eye, and much nearer the snout than the gill-opening. Two nostrils, one between the eyes, and a second tubular one before the lower eye. *Fins*—longest dorsal rays 1/3 of height of body. *Scales*—ctenoid on both sides. *Lateral-lines*—two on the coloured side divided by 15 or 16 rows of scales: a single lateral-line on the blind side. *Colours*—brown, with some vertical irregular bands of a darker colour and also blotches, fins dark with light edges, each scale with a dark line along its centre.

This species is closely allied to *C. brachyrhynchus*, which however has rather a shorter head, higher body, whilst the proportions of the head differ, and there are 17 or 18 rows of scales between the lateral-lines on the coloured side.

Ham. Buchanan's fish of which he has left a figure, "*Acheirus kukur jibha*" appears to be this species. It is said to have no appreciable nostrils, but Buchanan observes, "I have not been able to observe any *nostril*, unless it be concealed in a small membrane proceeding from the upper jaw, and below the under eye" (? the tubular nostril): Cantor and Günther likewise observe, no conspicuous nostril, but the specimens of the former author which are now in the British Museum, are dried skins, painted and smothered with varnish. As far as I can judge it is this species which is not uncommon at Calcutta.

Habitat.—Hooghly at Calcutta, seas and estuaries of India. It attains about 6 inches in length. The specimen figured was from Calcutta.

14. Cynoglossus lida, Plate XCVII, fig. 3.

Plagusia lida, Bleeker, p. 413, and Pleur. p. 23.
Arelia lida, Bleeker, En. pisc. p. 184.
Cynoglossus lida, Günther, Catal. iv, p. 498; Bleeker, Atl. Ich. Pleuronec. p. 36, t. 243, f. 2.

B. vi, D. 99-104, V. 4, A. 75-83, C. 12, L. l. 90.

Length of head 5, height of body 4 to $4\frac{2}{3}$ in the total length. *Eyes*—diameter about 13 in length of head, $4\frac{1}{2}$ diameters from end of snout and nearly 1 apart, the upper eye one half in advance of the lower. Head 1/6 longer than high. Angle of mouth below the hind edge of the lower orbit and midway between snout and gill-opening. Rostral hook just covers symphysis of lower jaw. Two nostrils, a patent one between the eyes and a tubular one before the lower eye. *Fins*—highest dorsal ray equals one-third of the height of the body. Ventral not united to anal. *Scales*—ctenoid on both sides. *Lateral-lines*—two on the coloured side separated at their greatest distance by 13 rows of scales. A single lateral-line on the blind side. *Colours*—brownish, a dark mark on opercle.

Habitat.—Burma to the Malay Archipelago.

15. Cynoglossus semifasciatus, Plate XCVII, fig. 5.

B. vi, D. 98-103, V. 4, A. 75-80, L. l. 85.

Length of head $4\frac{2}{3}$, height of body $3\frac{2}{3}$ in the total length. *Eyes*—close together, the upper scarcely in advance of the lower, 8 diameters in the length of head, and $2\frac{1}{2}$ from end of snout. Head 1/4 longer than high: snout $3\frac{1}{2}$ times in the length of the head. The rostral hook covers the symphysis of the lower jaw, and extends to below the front edge of the upper eye. Angle of the mouth 1 diameter behind the posterior edge of the lower eye and slightly nearer the snout than the gill-opening. Two nostrils, one between the eyes, a tubular one in front of the lower orbit. *Fins*—highest dorsal rays about 1/5 of the height of the body: a single ventral attached to the anal. *Scales*—ctenoid on both sides. *Lateral-lines*—two on the coloured side,

separated at their greatest distance by 12 or 13 rows of scales : a single lateral-line on the blind side. *Colours*—deep brown, with vertical incomplete or half bands irregularly disposed. They are extended on to the dorsal and anal fins.

Habitat.—Sea at Madras.

16. Cynoglossus puncticeps, Plate XCVII, fig. 1.

Plagusia puncticeps, Richards. Ich. China, p. 280.

Plagusia Javanica, (K. and v. H.) Bleeker, Pleuron. p. 24, and Nat. Tyds. Ned. Ind. i, p. 414.

Arelia Javanica, Kaup, Uebers, Plagus. Arch. Nat. xxiv, i, p. 108; Bleeker, en Spec. p. 104.

Cynoglossus puncticeps, Günther, Catal. iv, p. 500; Kner, Novara Fische, p. 297; Bleeker, Atl. Ich. Pleur. p. 37, t. 246, f. 7.

B. vi, D. 94-100, V. 4, A. 74-80, C. 12, L. l. 95-100.

Length of head $5\frac{1}{4}$ to $5\frac{2}{3}$, height of body $3\frac{1}{2}$ to 4 in the total length. *Eyes*—diameter $8\frac{1}{2}$ in the length of head, nearly 3 diameters from the end of snout, and close together: the upper one-half in advance of the lower. Head rather higher than long. The length of the snout equals about 1/3 of that of the head. The angle of the mouth situated below the middle or last third of the eye: the rostral hook covers the mandibular symphysis. Two nostrils, a patent one between the orbits and a tubular one opposite the anterior-inferior angle of the lower eye. *Fins*—right ventral absent. Dorsal and anal fin-rays low, the highest equalling 1/4 of the height of the body. *Scales*—ctenoid on both sides. *Lateral-lines*—two on the coloured side, separated by sixteen or seventeen rows of scales: a single one on the blind side. *Colours*—on the left side reddish-brown with irregular vertical bands which are continued on to the dorsal and anal fins.

Habitat.—From Sind through the seas of India to the Malay Archipelago and China. The one figured was from Madras.

17. Cynoglossus brevis, Plate XCVII, fig. 2.

Günther, Catal. iv, p. 500.

B. vi, D. 95, V. 4, A. 70-75, C. 12, L. l. 96.

Length of head $5\frac{1}{2}$ to $5\frac{2}{3}$, height of body $3\frac{1}{4}$ to $3\frac{1}{3}$ in the total length. *Eyes*—situated close together, the upper slightly in advance of the lower, diameter 9 to 10 in length of head, 3 diameters from the end of snout. Head 1/4 higher than long: snout 3 to $3\frac{1}{4}$ in the length of head, the angle of the mouth beneath the middle of the lower eye. Two nostrils, one between the eyes, the other tubular before the lower eye. Rostral hook covers symphysis. *Fins*—highest dorsal rays 5 in the height of the body, a single ventral attached to the anal. *Lateral-lines*—two on the coloured side, separated at their greatest distance by seventeen or eighteen rows of scales: a single lateral-line on the blind side. *Scales*—ctenoid on both sides. *Colours*—of a rich purplish-brown, with vertical bands extending on to the fins.

Habitat.—Hooghly at Calcutta.

18. Cynoglossus brevirostris, Plate XCVII, fig. 6.

B. vi, D. 91, V. 4, A. 76, C. 13, L. l. 78.

Length of head 5, height of body $4\frac{1}{4}$ in the total length. *Eyes*—minute, situated rather close together, the upper half in advance of the lower. Head as long as high. Angle of mouth 1 diameter behind the lower eye, and situated nearer the end of the snout than the gill-opening. Rostral hook extends to below the front edge of the upper eye. Snout $3\frac{1}{6}$ in the length of the head. Two nostrils, a patent one between the nostrils and a tubular one before the lower eye. *Fins*—highest dorsal ray equals 1/4 of the height of the body. Ventral united to the anal. *Scales*—ctenoid on both sides. *Lateral-lines*—two on the coloured side separated at their greatest distance by ten rows of scales: a single lateral-line on the blind side. *Colours*—brownish.

Habitat.—Madras, from whence a single specimen (figured life-size) was procured.

Order III—PHYSOSTOMI, *Müller*.

All the fin rays articulated, with the exception of the first in the dorsal and pectoral, which are frequently more or less ossified. Ventral fins, when present, abdominal and spineless. Air-vessel, if existing, having a pneumatic duct (except in the family *Scombresocidæ*).

SYNOPSIS OF FAMILIES AMONGST THE PHYSOSTOMI.

1. *Siluridæ.* Sub-opercle absent. Margin of upper jaw formed by the premaxillaries. Skin scaleless and smooth, or covered with osseous plates or scattered tubercles. Adipose dorsal usually present.

2. *Scopelidæ.* Pseudobranchiæ well developed. Margin of upper jaw formed by premaxillaries. Opercular pieces sometimes incomplete. No barbels. Gill-openings very wide. Scales present or absent. Adipose dorsal present.

3. *Scombresocidæ.* Pseudobranchiæ glandular. Margin of upper jaw formed by premaxillaries and maxillaries. Lower pharyngeals united. No adipose dorsal. Scales present. Air-vessel, when present, destitute of pneumatic duct.

4. *Cyprinodontidæ.* Pseudobranchiæ absent. Margin of upper jaw formed by premaxillaries. Barbels absent. Teeth in both jaws, in superior and inferior pharyngeals. One spineless dorsal in posterior half of body. Air-vessel simple.

5. *Cyprinidæ.* Pseudobranchiæ, when present, glandular. Margin of the upper jaw formed by the premaxillaries. Opercular pieces complete. Mouth toothless, teeth in lower pharyngeals. Head scaleless, body scaled or scaleless, never covered by osseous plates. Air-vessel present or absent.

6. *Clupeidæ.* Pseudobranchiæ usually well developed. Margin of the upper jaw formed by premaxillaries and maxillaries. Opercular pieces complete. Abdomen usually keeled. No adipose dorsal. Scales on body, none on head. Pyloric appendages numerous.

7. *Notopteridæ.* Pseudobranchiæ absent. Margin of upper jaw formed by premaxillaries and maxillaries. Opercular apparatus incomplete: a parieto-mastoid cavity on either side, leading into the interior of the skull. A single rayed dorsal fin, a long anal. Head and body scaled. Two pyloric appendages.

Family, I—SILURIDÆ.

Margin of the upper jaw formed mainly by the premaxillaries: the maxilla rudimentary, often constituting the base of a barbel: no sub-opercle. Either the rayed or adipose dorsal fins may be present or absent. Skin scaleless, and either smooth or covered with osseous plates, or scattered tubercles. Air-vessel, when present, either free in the abdominal cavity or more or less enclosed in bone, it communicates with the organs of hearing by means of the auditory bones.

The Siluroid, or scaleless fishes, are popularly termed cat-fishes, due to their being provided with a number of feelers or long barbels arranged around the mouth. They mostly prefer muddy to clear water, and the more developed the barbels, the more these fishes appear to be adapted for an inland and muddy fresh-water residence.

The wider and deeper the rivers the more suited they are for the *Siluridæ*, consequently the larger forms are comparatively rare in the south of India, whilst they abound in the Indus, Jumna, Ganges, Irrawaddi and other Burmese rivers.

Due to their usual resort, these fishes appear to employ their feelers in moving about in muddy places, and consequently have less use for their eyes than forms that reside in clear pieces of water. Thus it is, that the size of the eye as compared with the length of the head is much greater in the young than in the adult. The eye in fact atrophies, it does not increase in size in proportion with the remainder of the head, consequently the length of the specimen must be taken into consideration. Some of these fishes have the skin of the head passing over the eye without any trace of a free orbital margin, but this again may at times be due to age, thus in the young of *Macrones chryseus* we find no free orbital margin, but one is distinctly present in the adult.

In the genus *Arius* and some allied forms the males appear to carry the ova in their mouths perhaps until the young are produced.*

Many of these fishes are credited with causing poisonous wounds, and we frequently find such cases admitted into hospitals. They may be divided into two classes, (1) those in which the wounds are of a distinctly venomous description, (2) those in which their jagged spines occasion intense inflammation often of a dangerous character.

The respiration of these fishes is effected in two ways, and it may be appropriate here to refer to the amphibious fishes of India, as the *Labyrinthici* and *Ophiocephalidæ*.

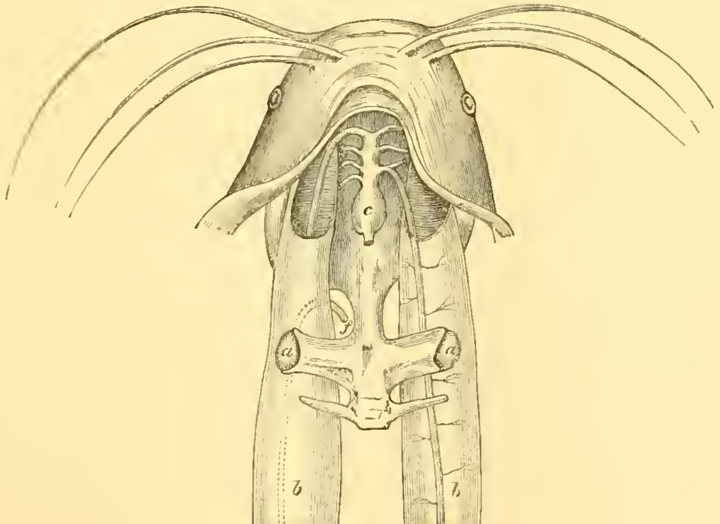
Respiration in fishes is carried out normally (1) by their using the air which is in solution in the water to oxygenate the blood at their gills, (2) by taking in atmospheric air direct which is employed at a special organ, where it oxygenates the blood, which can be returned for use into the general circulation without its going through the gills, thus constituting true amphibious fishes.†

No doubt we observe that fishes which normally oxygenate their blood solely at their gills do rise to the surface in very hot weather, when the water is foul or insufficiently charged with air and take in air by the mouth.

Likewise we find that those which mainly take in atmospheric air direct by the mouth may, to a certain extent, be able to use their gills.

If fishes having these two different modes of respiration are placed in a globe of water, across which a diaphragm of net is inserted below the surface so as to prevent their obtaining access to the atmosphere, those of the first class which oxygenate their blood at the gills are unaffected, whereas those which take in air direct, or amphibious fishes, die, due to blood poisoning.

If we seek for the reason, we find that the amphibious fishes have accessory breathing organs, those of the *Ophiocephalidæ* and *Labyrinthici* have been referred to(pp. 362, 369). Amongst the *Siluridæ* we also find amphibious forms: thus the *Clarias* has a dendritic apparatus attached to the branchiæ (Plate CXII, fig. 5*a*), and the *Saccobranchus* has a long air‡ or respiratory sac passing backwards amongst the muscles of the back from behind the gill cavity proper. The woodcut (after Hyrtl) explains how this is effected. The transverse



processes of the first vertebra are dilated to enclose the air-vessel (*a*) in a bony capsule, from each of these air-vessels there passes a duct which goes to the pharynx, this air-vessel has nothing to do with amphibious respiration, it is the swim-bladder partially enclosed in bone.

The respiratory air-sac (*b*) passes down amongst the muscles of the back from behind the gills. The blood from the heart goes up the bulbus arteriosus (*c*) and divides into branches on either side, one of which goes to each respiratory air sac, the anterior on the right, the posterior on the left side. The one on the right (*d*) goes along the upper wall of the sac, whilst on the left (*e*) one traverses the lower wall, giving off numerous lateral branches. From this respiratory air-sac the purified blood is returned by a vessel (*f*) which conveys it direct to the aorta.§

* See remarks under the head of genus *Arius*.

† See paper on this subject, Proc. Zool. Soc. 1858, p. 274.

‡ This is not the air-vessel or swim-bladder seen in the majority of *Teleosteous* fishes, as that also exists more or less enclosed in bone.

§ See paper in Journal Linn. Soc. read January 18th, 1877.

It is thus evident that blood can be purified at these respiratory air-sacs, and these fishes can be kept alive hours, and even days, without being in water, thus enabling them to traverse considerable distances where aquatic respiration would be impossible. They are also able when in water, to depurate some of the blood at the gills, if occasion should necessitate them to do so.

The air-vessel or swim-bladder (not respiratory air-sac) exists in two forms amongst the *Siluridæ*. In marine ones it is thick and not enclosed in bone, likewise in most of the fresh-water forms it is not enclosed in bone, but as we approach the hills a change occurs, and in most of the genera it possesses an osseous covering. The same character having been considered as valid for sub-dividing the *Cyprinidæ*, I have deemed it not inappropriate for similar employment in the *Siluridæ*.

Geographical distribution.—Fishes of this family are very abundant in the fresh waters of India, likewise in the estuaries and sea; they are not so common however in the clear waters around the Andamans.

Uses.—As a rule (excluding the *Pseudeutropius*, *Callichrous*, and *Ailia*) these Siluroids are more eaten by the poorer than the richer classes, and for two reasons, first, they are forbidden to Jews and Mahomedans,* and secondly, they are very foul feeders. The *Saccobranchus* and *Clarias* however are deemed nourishing and often prescribed for patients recovering from illnesses. The air-vessels of the marine forms are collected for export to China, as they afford a coarse isinglass.

SYNOPSIS OF GENERA.

A. *Air-vessel not enclosed in bone.*

a. An adipose dorsal.

1. *Macrones.* Gill-openings very wide, the membranes not being confluent with the skin of the isthmus, but overlapping one another, being cleft nearly to the chin. Eyes with free orbital margins. Teeth present on the palate. Barbels eight. Dorsal and pectoral spines. Ventral with six, anal with from about eight or nine to twenty or more rays. Throughout most parts of Asia, almost invariably in fresh water.

2. *Leiocassis.* Gill-openings very wide, the membranes not being confluent with the skin of the isthmus, but overlapping one another, being cleft nearly to the chin. Eyes subcutaneous. Teeth present on the palate. Barbels eight. Dorsal and pectoral spines. Ventral with six, anal with from about 15 to 20 rays. Eastern Bengal to the Malay Archipelago.

3. *Erethistes.* Gill-openings narrow, the membranes being confluent with the skin of the isthmus. Mouth narrow. Occipital, scapular, and humeral processes well developed. Eyes subcutaneous. No palatine teeth. Barbels eight. Dorsal and pectoral spines present. Ventral with six, anal with about ten rays. Orissa, through Bengal to Burma.

4. *Rita.* Gill-openings wide, the membranes not being confluent with the skin of the isthmus, and scarcely or not notched. Eyes subcutaneous. Teeth present on the palate. Barbels six or eight. Strong dorsal and pectoral spines. Ventral with seven or eight rays, anal with twelve to thirteen. Throughout Sind and India (except Mysore and Madras) to Burma.

5. *Arius.* Gill-openings wide, the membranes not being confluent with the skin of the isthmus, and scarcely or not notched. Eyes with free orbital margins. Teeth present or absent on the palate. Barbels six. Dorsal and pectoral spines. Ventral with six, anal with from about fourteen to at least twenty-four rays. Tropical seas.

6. *Batracocephalus.* Gill-openings wide, the membranes not confluent with the skin of the isthmus, but not notched. Eyes with free orbital margins. Teeth present on the palate. Barbels two. Dorsal and pectoral spines. Ventral with six, anal with about twenty rays. Seas and estuaries of India and Burma, to the Malay Archipelago.

7. *Ketengus.* Gill-openings wide, the membranes not confluent with the skin of the isthmus, but not notched. Eyes with free orbital margins. No teeth on the palate. Barbels six. Dorsal and pectoral spines. Ventral with six, anal with about twenty rays. Andamans to the Malay Archipelago.

8. *Osteogeniosus.* Gill-openings very wide, the membranes not being confluent with the skin of the isthmus, but overlapping one another, being notched. Eyes with free orbital margins. Teeth on the palate. Barbels, one pair of semi-osseous maxillary ones. Dorsal and pectoral spines. Ventral with six, anal with from about nineteen to twenty-four rays. Seas and estuaries of India to the Malay Archipelago.

9. *Pangasius.* Gill-openings wide, the membranes not confluent with the skin of the isthmus, and rather deeply notched. Eyes with free orbital margins. Teeth present on the palate. Barbels four. Dorsal and pectoral spines. Ventral with six, anal with from about twenty-nine to thirty-nine rays. Large rivers and estuaries of India and Burma to the Malay Archipelago.

10. *Pseudeutropius.* Gill-openings wide, the membranes not confluent with the skin of the isthmus and rather deeply notched. Eyes with broad adipose lids. Teeth present on the palate. Barbels eight. Dorsal and pectoral spines. Ventral with six or eight rays: anal with from about twenty-seven to fifty-five rays. Fresh waters of Hindustan to the Malay Archipelago.

* Finding Mahomedans eating the scaleless forms in Sind I enquired the reason, observing that such were forbidden. They told me however that such was not the case, as Mahomed hullaaled fish (cut their throats to prevent the blood being eaten) and those with gill-openings are permitted to "the Faithful."

11. *Olyra.* Gill-openings wide, the membranes not being confluent with the skin of the isthmus. Eyes subcutaneous. Teeth on the palate. Barbels eight. Rayed dorsal fin with a short spine: no pectoral spine. Ventral with six, anal with from fifteen to about twenty-three rays. Caudal rounded or lanceolate. Assam to Pegu.

b. A single rayed and no adipose dorsal fin.

12. *Callichrous.* Gill-openings wide, the membranes not being confluent with the skin of the isthmus. Cleft of mouth does not extend to the eye. Eyes without free orbital margins. Teeth on the vomer. Barbels two or four. Rayed dorsal fin when present small. A pectoral spine. Ventral with ten or less rays: anal with from about forty-five to ninety-five rays. Fresh waters of India, Ceylon, Burma to the Malay Archipelago and China.

13. *Wallago.* Gill-openings wide, the membranes not being confluent with the skin of the isthmus. Cleft of mouth deep, extending to behind the eyes. Eyes without free orbital margins. Teeth on the vomer. Barbels four. Rayed dorsal fin short, spineless. A pectoral spine. Ventral with nine or ten rays: anal with sixty-five to ninety-five rays. Fresh waters of India and Burma to the Malay Archipelago.

14. *Silurus.* Gill-openings wide, the membranes not being confluent with the skin of the isthmus. Eyes with free orbital margins. Teeth on the palate. Barbels four or six. Rayed dorsal fin without spine: no adipose fin. Pectoral with a spine. Ventral with eight or more rays: anal with from sixty to ninety rays. From eastern Europe, through Turkestan, and some of the higher Indian mountains, to the hill ranges of Burma, the Malay Archipelago, China, and Japan.

c. Two rayed but no adipose dorsal fin.

15. *Chaca.* Gill-openings narrow, the membrane being confluent with the skin of the isthmus. Mouth very wide. Eyes rudimentary. No teeth on the palate. Barbels six. Dorsal and pectoral spine. Ventral with six rays: anal divided into two portions. Eastern Bengal, Burma to the Malay Archipelago.

16. *Plotosus.* Gill-openings wide, the membranes not being confluent with the skin of the isthmus. Eyes with a free orbital margin. Teeth on the palate. Barbels eight. Two rayed dorsal and anal fins: first dorsal and pectoral with a spine. Ventral with about twelve rays: second dorsal and anal with numerous rays and confluent with the caudal. Red Sea, east coast of Africa, seas of India to the Malay Archipelago and Australia.

B. *Air-vessel more or less enclosed in bone.*

a. No adipose dorsal fin.

17. *Clarias.* Gill-openings very wide, the membranes not being confluent with the skin of the isthmus and separated to the chin. Eyes with a free orbital margin. Teeth on the palate. Barbels eight. A single elongated rayed dorsal and anal fin: a pectoral spine. Ventral with six rays. A dendritic accessory branchial apparatus attached to some of the branchial arches. Africa and a great portion of Asia, including the Indian region and the Malay Archipelago to China.

18. *Saccobranchus.* Gill-openings very wide, the membranes not being confluent with the skin of the isthmus and separated to the chin. Eyes with a free orbital margin. Teeth on the palate. Barbels eight. A short spineless dorsal fin: an elongated anal one (sixty to eighty rays). A strong pectoral spine. Ventral with six rays. An elongated respiratory air-sac, extending backwards amongst the muscles of the back on either side of the neural spines. Sind, India and Ceylon to Burma and Cochin China.

b. An adipose dorsal fin.

19. *Silundia.* Gill-openings very wide, the membranes not being confluent with the skin of the isthmus and separated to the chin. Eyes with a broad, circular adipose lid and free orbital margin. Teeth on the palate. Barbels two or four. A short dorsal fin having a spine: an elongated anal (forty or fifty rays). A pectoral spine. Ventral with six rays. India and Burma.

20. *Ailia.* Gill-openings wide, the membranes not being confluent with the skin of the isthmus. Eyes with a free orbital margin. Teeth on the palate. Barbels eight. No rayed dorsal fin. Pectoral with a spine: an elongated anal (sixty to seventy-five rays): a pectoral spine. Ventral with six rays. Sind, the valley of the Ganges, and Assam.

21. *Ailiichthys.* Similar to *Ailia* but destitute of ventral fins. Indus and Punjab rivers, also Ganges and Jumna.

22. *Eutropiichthys.* Gill-openings very wide, the membranes not being confluent with the skin of the isthmus and separated to the chin. Eyes having a broad circular adipose lid. Teeth on the palate. Barbels eight. A short dorsal fin with a spine: a pectoral spine: an elongated anal fin (forty-seven to fifty rays). Ventral with six rays. Large rivers of India and Burma.

23. *Amblyceps.* Gill-openings wide, the membranes not being confluent with the skin of the isthmus and notched to the chin. Eyes subcutaneous. No teeth on the palate. Barbels eight. Dorsal fin with one spine and six rays: a small pectoral spine. Anal rather short (eleven to twelve rays). Ventral with six rays. Valley of Ganges, eastern Bengal to Burma.

24. *Sisor.* Gill-openings narrow, the membranes being confluent with that of the isthmus. Eyes small. Osseous plates along the back, the adipose fin in the form of a short spine. Teeth absent. Barbels, one maxillary and several mandibular pairs. A short dorsal fin with one spine and six rays: a pectoral

spine. Anal short (six rays). Ventral with seven rays. Upper caudal ray very elongate. Jumna and Ganges rivers.

25. *Gagata.* Gill-openings rather narrow, the membranes being confluent with the skin of the isthmus. Eyes subcutaneous. No teeth on the palate. Barbels six or eight. Dorsal with one spine and six rays: a pectoral spine. Anal rather short. Ventral with six rays. Throughout India, (except its southern portion) Assam and Burma.

26. *Bagarius.* Gill-openings wide, the membranes confluent with the skin of the isthmus. Eyes with free orbital margins. No teeth on the palate. Barbels eight. Dorsal fin with one spine and six rays. A pectoral spine: anal rather short. Ventral with six rays. Throughout large rivers of India and Burma to Java.

27. *Glyptosternum.* Gill-openings wide, the membranes confluent with the skin of the isthmus. Eyes subcutaneous. No teeth on the palate. Barbels eight. Dorsal fin with one spine and six or seven rays. A pectoral spine. Anal short. Ventral with six rays. An adhesive apparatus formed of longitudinal plaits of skin situated on the chest between the bases of the pectoral fins. Hill streams and rapid rivers of the plains of India to the Malay Archipelago.

28. *Euclyptosternum.* As in last Genus but having palatine teeth. Syria, Assam.

29. *Pseudecheneis.* Gill-openings narrow, not extended on to the lower surface of the head. Eyes small. No teeth on the palate. Barbels eight. Dorsal fin with one spine and six rays: a pectoral spine. Anal rather short (eleven rays). Ventral with six rays. An adhesive apparatus formed of transverse folds of skin situated on the chest between the bases of the pectoral fins. Himalayas at the head waters of the Ganges, also the Kasya hills.

30. *Exostoma.* Gill-openings narrow, not extending on to the lower surface of the head. Eyes subcutaneous. No teeth on the palate. Barbels six or eight. Dorsal fin with one spine and six rays. Pectoral sub-horizontal with a spine. Anal short. Ventral with six rays. Head waters of Indus along the Himalayas to Assam, Pegu, Tenasserim, and the confines of China.

Genus, 1—Macrones, *Dumeril.*

Bagrus, pt. Cuv. and Val.; *Hypselobagrus*, *Hemibagrus*, *Pseudobagrus* and *Aspidobagrus*, Bleeker.

Branchiostegals from six to twelve. Mouth terminal, transverse. Upper jaw generally the longer. Gill-openings wide, the gill-membranes overlapping the isthmus and being separate to the chin. Eyes with free circular lids. Barbels eight, one nasal, one maxillary, and two mandibular pairs. A distinct and separate interneural shield on the nape, closely connected to the basal bone of the dorsal fin: or no such shield. Villiform teeth in the jaws, and in a more or less uninterrupted curved band across the palate. Rayed dorsal fin with one spine and seven rays: adipose dorsal of varying length: pectoral with a strong serrated spine: anal short or of moderate length: ventral with six rays: caudal forked. Air-vessel of moderate or large size, attached to the under surface of the bodies of the anterior vertebræ. An axillary pore generally present.

These fishes have been divided as follows:—

Pseudobagrus. Anal fin with 20 rays or upwards, as *M. chryseus.*

Hypselobagrus. Adipose dorsal much longer than the anal, as *M. cavasius.*

Macrones. Adipose dorsal not much longer or shorter than the anal: a separate interneural shield on the nape, as *M. seenghala.*

Hemibagrus. Adipose dorsal as in *Macrones*, no separate interneural shield as *M. gulio.*

As we find the number of rays in the anal fin vary in specimens taken in India from *M. Bleekeri* with A. 9-10, *M. Malabaricus*, A. 10-11, *M. tengara*, A. 11-13, *M. gulio*, A. 12-15, or in fact a smaller difference in the number of anal rays between the first mentioned with A. 9, and the last with A. 15, than exists between the last (*M. gulio*) and a species with 20 anal rays I have not employed this arbitrary division of the genus. Whether *M. aor* or *M. seenghala* which have a separate interneural shield and an air-vessel with a posterior elongated extremity, should not be separated from the remainder which have no such distinct shield and no prolongation of the air-vessel, may be open to question.

The ova of these fishes are small, consequently very different to what we perceive in their marine relatives, the *Arius* and neighbouring Genera.

Geographical distribution.—These fishes extend through most parts of Asia, and are numerous in the fresh waters of India and Ceylon, one species (*M. gulio*) often being captured in the sea.

Uses.—Employed as food by the poorer natives, but are of inferior quality, being rather insipid.

SYNOPSIS OF SPECIES.

1. *Macrones chryseus*, A. 26-28. Golden, with a large black shoulder spot. Malabar coast of India.

2. *Macrones aor*, A. 12-13. Maxillary barbels reach caudal fin. A black spot on adipose dorsal fin. Throughout Sind and India to Burma.

3. *Macrones seenghala*, A. 11-12. Maxillary barbels reach hind edge of first dorsal fin. Punjab, Sind, Jumna, Ganges, and Brahmaputra rivers, also Deccan and Kistna river to its termination.

4. *Macrones Blythii*, A. 12. Maxillary barbels reach front edge of eye. A dark shoulder spot, another on the adipose dorsal, body with indistinct cross bands. Tenasserim provinces.

5. *Macrones gulio*, A. 12-15. Occipital process half longer than wide at its base, a long interspace

between it and basal bone. Length of base of adipose dorsal equal to half that of the interspace between the two dorsal fins. Coasts, estuaries, and tidal waters, of the whole of India and Burma.

6. *Macrones punctatus*, A. 11-13. Upper surface of the head almost smooth. Occipital process very narrow, a long interspace between it and basal bone of the dorsal fin. Brown, with some black spots along the sides. Bowany river at foot of Neilgherry hills.

7. *Macrones corsula*, A. 11-13. Upper surface of the head roughened. Occipital process short, with a long interspace between it and the basal bone of the dorsal fin. Brown, with some black spots along the sides. From Orissa, through Bengal and Assam.

8. *Macrones microphthalmus*, A. 12. Occipital process short, with a long interspace between it and the basal bone of the dorsal fin. Dorsal spine smooth, weak, articulated in its upper three-fourths. Burma.

9. *Macrones cavasius*, A. 11-13. Occipital process reaches basal bone. Maxillary barbels reach caudal fin. Adipose dorsal long, commencing just behind the rayed fin. Dorsal spine entire. Silvery, often with a black spot at base of dorsal spine, and fins stained with dark. Sind, throughout India and Assam to Burma.

10. *Macrones tengara*, A. 11-13. Median groove on head reaches base of occipital process, which latter reaches the basal bone of the dorsal fin. Golden, with a black shoulder spot and about five longitudinal dark bands. Northern India and Assam.

11. *Macrones oculatus*, A. 11-13. Eye 3 to $3\frac{1}{2}$ in length of head: occipital process reaches basal bone. Maxillary barbels reach middle of anal fin. Base of adipose dorsal as long as that of the rayed fin. Dark spot anteriorly at base of dorsal fin. Malabar coast and Coimbatore district.

12. *Macrones vittatus*, A. 9-12. Median groove on head does not reach the base of the occipital process, which latter reaches the basal bone of the dorsal. Sind, India, and Burma.

13. *Macrones leucophasis*, A. 11-12. Maxillary barbels reach anal fin. Purplish-black, with some white spots. Burma.

14. *Macrones montanus*, A. 12. Head 5 in the total length. Median groove on head does not reach occipital process, which last extends to the basal bone. Maxillary barbels reach anal fin. A dark shoulder mark, a light band along the body, and dark spot at base of caudal. Western ghauts.

15. *Macrones keletius*, A. 9-10. Head $4\frac{2}{3}$ in the total length. Median groove on head does not reach occipital process, which last does not quite reach the basal bone. Maxillary barbels reach middle of anal fin. A large pre-anal papilla. A dark shoulder mark. Coromandel coast.

16. *Macrones Malabaricus*, A. 10-11. Head $4\frac{3}{4}$ to $5\frac{1}{2}$ in the total length. Median groove on the head does not reach base of occipital process, which last has a long interspace between it and the basal bone. Maxillary barbels reach middle or end of ventral fin. A dark shoulder spot, another at base of caudal fin. Malabar coast and Western ghauts.

17. *Macrones armatus*, A. 11. Head $5\frac{1}{2}$ in the total length. Median groove on the head almost reaches the base of the occipital process, which last reaches the basal bone. Maxillary barbels reach end of ventral fin. A dark blotch at base of caudal fin. Malabar and western ghauts.

18. *Macrones Bleekeri*, A. 9-10. Head $5\frac{1}{4}$ to $5\frac{1}{2}$ in the total length. Median groove on the head reaches the base of the occipital process, which last reaches the basal bone. Maxillary barbels reach the anal fin. Two light longitudinal bands, and sometimes a dark shoulder spot. Indus, Jumna, and upper part of the Ganges rivers, also the Irrawaddi in Burma.

1. Macrones chryseus, Plate XCIX, fig. 3.

Pseudobagrus chryseus, Day, Proc. Zool. Soc. 1865, p. 271, and Fish. Mal. p. 185, pl. xiii, f. 2.
Mungil yata, Mal.; *Neela katurnee*, Hind.

B. x, D. $\frac{1}{7}$ | 0, P. 1/6, V. 6, A. 26-28, C. 17-19.

Length of head $4\frac{1}{3}$ to $4\frac{2}{3}$, of caudal 5, height of body 5 in the total length. *Eyes*—diameter 4 to 5 in the length of head, $1\frac{1}{2}$ diameters from the end of snout, and 2 to $2\frac{1}{2}$ apart. Greatest width of the head equals 4/5 of its length. Upper jaw slightly the longer. Width of gape of mouth nearly equal to half the length of the head. Upper surface of head, opercles, and humeral process with smooth ridges. Occipital process twice as long as wide at its base, no interspace between it and the basal bone. The superior longitudinal groove on the head shallow, reaching to opposite the hind edge of the eye. *Barbels*—the nasal rather above half the length of the head, the maxillary slightly longer: the external mandibular reach the base of the pectoral fin, whilst the internal ones are one-fourth shorter. *Teeth*—in a narrow uninterrupted semilunar band across the palate. *Fins*—dorsal spine as long as the head behind the middle of the eyes, strong, with about ten denticulations posteriorly, and three or four anteriorly near its summit, whilst it ends in a soft prolongation: adipose fin short, commencing over the last fourth of the anal. Pectoral reaches the ventral, its spine stronger than that of the dorsal and as long as the head excluding the snout, serrated externally and with 16 or 18 strong teeth internally. Ventral rather above half as long as the pectoral and reaches the anal, the base of which last fin equals the length of the head, it is highest anteriorly. Caudal slightly, or deeply lunated or even forked. Free portion of tail rather higher than long. *Colours*—back greenish-yellow, sides golden: a large round black mark on the shoulder surrounded by a light yellow ring. Dorsal and anal fins yellowish-orange, stained with darker at their margins. Caudal yellow, with a black base and dark edges.

Habitat.—Rivers in Canara and Malabar, preferring the deepest pools, Longest specimen obtained

8 inches, but said to attain to double that size. Wounds from their spines are deemed venomous by the natives.

2. Macrones aor.

Pimelodus aor, Ham. Buch. pp. 205, 379, pl. 20, f. 68.

? *Bagrus aorinus*, Val. in Jacq. Voy. Ind. Or. pl. xvii, f. 1.

Bagrus aor, Cuv. and Val. xiv, p. 405; Jacq. l. c. pl. xvi, f. 1; Bleeker, Hind. p. 115; Blyth, P. A. S. of Beng. 1858, p. 283.

Bagrus aorides, Jerdon, M. J. L. and Sc. 1849, p. 337.

Macrones aor, Günther, Catal. v, p. 78.

Mukul-jellah, Tel.; *Cumboo kelletee*, Tam.; *Nga-joung*, Burm.; *Seengala* and *Sang-go-ah*, Punj.; *Singharee*, Sind.; *Alli* or *Addi*, Ooriah.

B. xii, D. $\frac{1}{7}$ | 0, P. 1/9-10, V. 6, A. 12-13 ($\frac{3}{9}$+), C. 17.

Length of head $4\frac{1}{2}$ to 5, of caudal 4, height of body 6 in the total length. *Eyes*—transversely oval, diameter 5 to 8 in the length of the head, $2\frac{1}{2}$ to 3 diameters from the end of snout, and $1\frac{2}{3}$ to 2 apart. Snout broad, depressed, the width of the gape being equal from 2/5 to 3/7 of the length of the head, whilst the cleft does not extend half-way to the orbit. The upper jaw the longer. Width of the head is 3/5 of its length, its upper surface rugose in tuberculated ridges. Occipital process does not extend half-way to the basal bone of the dorsal, whilst an intermediate interneural shield exists, and which is usually wider than the occipital process: the width of this bone is subject to great variations, thus in some old specimens it is only twice as long as broad, whilst in others and in some immature it is four times as long as wide. The longitudinal furrow on the head extends to the base of the occipital process. *Barbels*—the maxillary extend to, or even beyond, the base of the caudal fin: the nasal half-way to the orbit: the outer mandibular ones to the base of the pectoral, and the inner two-thirds of that distance. *Teeth*—in an uninterrupted semilunar band across the palate. *Fins*—dorsal spine rather weak, nearly or quite as long as the head (in the young occasionally shorter) finely serrated posteriorly. Pectoral as long as the head excluding the snout, and reaches 4/7 of the distance to the ventral, its spine is stronger than that of the dorsal but shorter, being equal to from 1/2 to 3/5 of the length of the head, it is rugose or finely serrated externally and denticulated internally. The adipose dorsal commences above the last third or end of the ventral, and its base equals about that of the rayed fin or even a little more, whilst the extent of the interspace between the two fins equals half the length of that of the rayed dorsal fin. Ventral arises below the last dorsal rays and does not reach the anal. Caudal with deeply pointed lobes, the three outer rays in the upper lobe being produced. Free portion of the tail rather more than twice as long as high at its base. *Air-vessel*—large and pyriform. *Colours*—bluish-leaden superiorly, becoming white beneath: fins yellowish, stained with dark externally in both the dorsal and caudal. A black spot about equal to the diameter of the eye on the soft dorsal on its posterior and inferior portion.

Blyth, Proc. A. S. of Beng. 1858, p. 284, observed of closely allied species that "there is a fourth in the *B. aorinus*, Jacq. The latter is not represented to have the conspicuous black spot on the adipose dorsal seen in the others."

Habitat.—Throughout Sind and India to Burma, a specimen in Calcutta is 3 feet long.

3. Macrones seenghala, Plate XCIX, fig. 1.

Platystomus seenghala, Sykes, Trans. Zool. Soc. ii, p. 371, pl. 65, f. 2.

Bagrus Lamarrii, Cuv. and Val. xiv, p. 407, pl. 415.

Bagrus aorellus, Blyth, Proc. A. S. of Bengal, 1858, p. 283.

Bagrus seenghala, Jerdon, M. J. L. and Sc. 1849, p. 337.

Macrones Lamarrii, Gunther, Catal. v, p. 79.

Teng ga-ra, Punj.

B. xii, D. $\frac{1}{7}$ | 0, P. 1/9, V. 6, A. 11-12 ($\frac{3}{8\text{-}9}$), C. 19-21.

Length of head $4\frac{1}{2}$, of caudal $4\frac{1}{2}$, height of body $7\frac{1}{2}$ to 8 in the total length. *Eyes*—diameter 7 to 8 in the length of head, 2 to $2\frac{1}{2}$ diameters from the end of snout, and $1\frac{1}{2}$ to 2 apart. The greatest width of the head equals 1/2 to 4/9 of its length: snout spatulate: upper jaw rather the longer: the width of the gape equals one-third of the length of the head, its cleft shallow. Upper surface of the head granulated in ridges, its median longitudinal groove reaches the base of the occipital process, which is twice as long as wide at its base, between its posterior extremity and the basal bone of the dorsal fin is a separate interneural shield from four times as long as broad in the young, to half that width in the adult. *Barbels*—the maxillary ones extend to the middle or just beyond the hind margin of the dorsal fin, the nasal to opposite the middle of the orbit, the external mandibular ones to the base of the pectoral, whilst the internal ones are one-third shorter. *Teeth*—on the palate in an uninterrupted crescentic band. *Fins*—dorsal one-third to one-half higher than the body, its spine rather weak, anteriorly rugose, indistinctly serrated posteriorly, and as long as the head excluding the snout: length of the base of the adipose dorsal equals or exceeds that of the rayed fin, whilst the intermediate distance is of the same length. Pectoral extends rather above half way to the ventral, its spine is stronger than that of the dorsal and half as long as the head, roughened externally, denticulated internally. Ventral arises behind the vertical from the last dorsal ray and reaches 2/3 of the distance to the anal. Caudal deeply forked, upper lobe the longer. *Air-vessel*—large, pear-shaped and not enclosed in bone. *Colours*—brownish along the back, silvery on the sides and beneath, a round black spot at the posterior end of the base of the adipose dorsal fin.

Very closely allied to *M. aor*, and chiefly distinguished by its much shorter maxillary barbels.

Habitat.—The Indus,* salt ranges of the Punjaub, Jumna and Ganges certainly as low as Delhi, also the Deccan, Kistna river to its termination, and Assam. It attains a considerable size.

4. Macrones Blythii.

Batasio affinis, Blyth, J. A. S. of Beng. 1860, p. 190 (not *Bagus affinis*, Jerdon, 1849.)

Macrones affinis, Günther, Catal. v, p. 83; Day, Proc. Zool. Soc. 1873, p. 111.

D. $\frac{1}{7}$ | 0, P. 1/7, V. 6, A. 12 ($\frac{3}{9}$), C. 17.

Length of head nearly 5, of pectoral 6, of caudal 6, height of body 5 in the total length. *Eyes*—diameter $3\frac{1}{2}$ in the length of head, 1 diameter from end of snout and $1\frac{1}{4}$ apart. Snout projecting. Median longitudinal groove on head indistinct, but reaching the base of the occipital process, which is narrow, twice as long as wide at its base, and separated from the basal bone of the dorsal fin by an interneural shield. *Barbels*—the maxillary which are the longest only reach the anterior margin of the orbit. *Teeth*—in an uninterrupted crescentic band across the palate. *Fins*—dorsal spine moderately strong, slightly serrated posteriorly in its upper fourth and rather above half the length of the head. Pectoral spine, slightly longer and stronger than that of the dorsal, and denticulated internally. Adipose dorsal commences not far from the hind edge of the first dorsal whilst its base is a little longer than that of the anal. Caudal forked, the lobes of nearly equal length. *Colours*—a dark spot on the shoulder, a second on the base of the adipose dorsal fin: body with indistinct cross bands.

Habitat.—Tenasserim provinces from whence one specimen 3·5 inches long was sent to the Calcutta Museum.

5. Macrones gulio, Plate XCIX, fig. 2.

Pimelodus gulio, Ham. Buch. Fish. Ganges, pp. 201, 379, pl. 23, f. 66.

Bagrus albilabrus, fuscus (mandibular barbels black) and *Birmannus*, Cuv. and Val. xiv, pp. 416, 417, 419.

Bagrus gulio, Cuv. and Val. xiv, p. 618; Bleeker, Beng. en Hind. p. 116, and Prod. Silur. p. 163; Blyth, P. A. S. of Beng. 1858, p 284.

Bagrus abbreviatus, (Kuhl. and v. Hass.) Cuv. and Val. xiv, p. 428; Cantor, Catal. p. 254.

Bagrus albilabris, Jerdon, M. J. L. and Sc. 1849, p. 338.

Bagrus gulioides, melas, Schlegelii, and *rhodopterygius*, Bleeker, Silur. Batav. pp. 24, 25.

Aspidobagrus gulio, Bleeker, Atl. Ich. Silur. p. 60, t. 74, f. 2.

Macrones gulio, Günther, Catal. v, p. 79.

Nuna tenggara, Beng.

B. ix, D. $\frac{1}{7}$ | 0, P. 1/8-9, V. 6. A. 12-15 ($\frac{3-4}{9-11}$), C. 17.

Length of head $4\frac{1}{4}$ to $4\frac{2}{3}$, of caudal $4\frac{1}{3}$, height of body 5 to $5\frac{3}{4}$ in the total length. *Eyes*—diameter 5 to 6 in the length of head, $1\frac{1}{2}$ diameters from the end of snout, and 2 diameters apart. Snout broad and slightly depressed, upper jaw somewhat the longer. Greatest width of head equals its length excluding the snout, and one-fourth broader than high. Upper surface of the head granulated, its median longitudinal groove lanceolate, extending to opposite the hind edge of the orbit. Occipital process rounded posteriorly and half longer than wide at its base, a considerable interspace† between it and the basal bone of the dorsal fin. *Barbels*—nasal shorter than the head, the maxillary reach to the middle or nearly the end of the ventral fin, the external mandibular are longer than the head or than the internal ones. *Teeth*—in a narrow, uninterrupted crescentic band across the palate. *Fins*—dorsal spine half as long as the head, strong, anteriorly with one or two teeth at its upper extremity, serrated posteriorly. Anterior rays longer than the spine. Adipose dorsal with a short base equalling about half of the interspace between the two fins. Pectoral does not reach the ventral, its spine is as long as the head excluding the snout, strong, and denticulated internally. Ventral arises on the vertical behind the last dorsal ray and does not reach the anal. Upper caudal lobe the longer, inferior one sometimes rounded. *Air-vessel*—heart shaped, divided along its centre by a strong partition, having a communicating orifice in its upper back part, whilst the whole has many subdivisions internally. *Colours*—lurid bluish-brown on the back becoming dull white beneath, fins especially on their outer halves, usually black: maxillary barbels mostly black, those from fresh waters sometimes have them whitish or white-tipped.

As in the rest of the genus *Macrones* the ova in this species are small. Some specimens from the Hooghly have 11 branched anal rays, and the maxillary barbels only reach the end of the pectoral fin.

Habitat.—Seas, estuaries, and tidal waters from Sind and Bombay, throughout India and Burma to the Malay Archipelago. There are stuffed specimens in the Calcutta Museum 18 inches in length.

6. Macrones punctatus, Plate C, fig 3.

Bagrus punctatus, Jerdon, M. J. L. and Sc. 1849, p. 339.

* Günther records "*e.* Half grown. Afghanistan. From Mr. Griffith's collection." This may be an error. The specimen was perhaps the one sent, as *Pimelodus aor*, by McClelland (see Cal. J. N. H. ii, p. 575) to the India Office, and he observed "*Pimelodus aor*, Buch. has been found also by Griffith to be one of the characteristic fishes of the Indus, as well as of the Ganges above Seharunpore, but disappears in Afghanistan," p. 568.

† This interspace appears to be absent in the immature, but increases with age.

Hemibagrus punctatus, Day, Proc. Zool. Soc. 1867, p. 284.
Sholang kelleté, Tam.

B. xi, D. $\frac{1}{7}$/0, P. 1/7, V. 6, A. 11-13 ($\frac{3-4}{8-9}$), C. 17.

Length of head $4\frac{1}{2}$ in the young to 5, of caudal $5\frac{1}{2}$, height of body $6\frac{1}{2}$ in the total length. *Eyes*—diameter 6 to 7 in the length of head, 2 diameters from end of snout, and $2\frac{1}{2}$ apart. Greatest width of head equals its length behind the nostrils: width of the gape of mouth equals 2/5 of length of head. Upper jaw slightly the longer. Interorbital space rather convex, upper surface of the head and shoulder bones furrowed, but without any tuberculated ridges. Median longitudinal groove very indistinct, lanceolate, and extending almost to the base of the occipital process which is narrow and has an interval equal to twice its length, betwen it and the basal bone. *Barbels*—nasal ones reach the hind edge of the orbit, the maxillary the base or middle of the ventral, the external mandibular the base of the pectoral, whilst the internal are one-third shorter. *Teeth*—on the palate in an uninterrupted crescentic band. *Fins*—dorsal spine of moderate strength, serrated posteriorly in its upper third, it is 1/2 as long as the head but shorter than the first ray: adipose dorsal with a short base, equalling half the distance of the interspace between it and the first dorsal fin. Pectoral spine longer and stronger than that of the dorsal, equal in length to the head excluding the snout, rugose externally, denticulated internally. Ventrals arise on a vertical line just posterior to the last dorsal ray. Upper caudal lobe the longer. *Colours*—head and back dark grayish olive, becoming yellow on the abdomen: about ten black, rounded spots, along the lateral-line: fins dusky, except the ventrals which are yellowish.

This fish is evidently very closely allied to *M. corsula*, but its head is much shorter in the adult, taking for examination specimens of the same size, the upper surface of its head is almost smooth, and its snout is not so flat.

Habitat.—Bowany river at base of Neilgherry hills, attaining at least 18 inches in length.

7. Macrones corsula, Plate C, fig. 5.

Pimelodus menoda, Ham. Buch. Fish. Ganges, pp. 203, 379.
Pimelodus corsula, Ham. Buch. l. c. pl. i, f. 72.
Bagrus trachacanthus, Cuv. and Val. xiv, p. 419.
Bagrus menoda, Blyth, P. A. S. of Beng. 1858, p. 285.
Macrones corsula, Day, Proc. Zool. Soc. 1869, p. 307.
Macrones menoda, Lütken, Vid. Medd. 1874, p. 216.
Punjah-guggah, Ooriah.

B. x, D. $\frac{1}{7}$ | 0, P. 1/9, V. 6, A. 12-13 ($\frac{3-5}{8}$), C. 17.

Length of head 4 to $4\frac{1}{3}$, of caudal 5 to 6, height of body 6 in the total length. *Eyes*—diameter $5\frac{3}{4}$ to 7 in the length of head, 2 diameters from the end of snout, and 2 to $2\frac{1}{2}$ apart: interorbital space nearly flat. The greatest width of the head equals its length excluding the snout. Upper jaw the longer. Median longitudinal groove on the head extends to the base of the occipital process in the young, not so far in the adult. Occipital process is very long and narrow, the width of its base being hardly equal to 1/5 of its length, but in old specimens the anterior portion of this bone becomes concealed by skin, and appears to be very short, a very slight interspace exists between it and the basal bone of the dorsal fin. Extent of gape of the mouth equals 3/8 of length of head. Upper surface of the head, opercles, and shoulder-bone, roughened by the presence of tubercular ridges. *Barbels*—the nasal ones extend to below the middle of the orbit: the maxillary ones to nearly or quite the base of the anal: the external mandibular to the base of the pectoral, and the internal to opposite the posterior extremity of the preopercle. *Teeth*—in an uninterrupted semilunar band across the palate. *Fins*—dorsal spine slender, serrated posteriorly in its upper half, it is half as long as the head: base of adipose dorsal differs in length, usually as long as, or longer than, that of the rayed fin. Pectoral spine strong, compressed, rugose externally, denticulated along its whole extent internally, it is as long as the head excluding the snout, and slightly longer than that of the dorsal. Ventral half as long as the head, and does not reach the anal: in some specimens the upper caudal lobe is prolonged. Free portion of the tail rather longer than high. *Colours*—superiorly grayish-brown, inferiorly dull white. Fins grayish, stained with black. Several vertical black spots along the anterior portion of the lateral-line.

I have found 12 to 13 rays in the anal fin in Assam specimens, which are the same number as given by Cuv. and Val. for *B. trachacanthus*, so I conclude the remark that, the lower caudal lobe is the longer must be a misprint. Blyth observes that it is "a very mucous fish, and those brought to the bazaar are commonly much clotted over with an adhesive clayey mud, as if they had burrowed into it, and they are mostly brought many together, appearing as if dug out from the mud of ponds more or less dried up."

Habitat.—From Orissa through Bengal and Assam; attaining a foot or more in length.

8. Macrones microphthalmus, Plate C, fig. 4.

Nga-ike, Burmese.

B. x, D. $\frac{1}{7}$ | 0, P. 1/9, V. 6, A. 12 ($\frac{3}{9}$), C. 17.

Length of head 4, of caudal $5\frac{1}{3}$, height of body $6\frac{3}{4}$ in the total length (excluding the filamentous prolongation of the caudal fin). *Eyes*—diameter 6 in the length of head, 2 diameters from the end of snout,

and $2\frac{1}{2}$ apart. The greatest width of the head equals its length excluding the snout. Upper jaw the longer, snout spatulate. Median longitudinal groove on the head reaches nearly to the base of the occipital process, which latter is pointed, scarcely longer than wide at its base, and with a long interspace between it and the basal bone of the dorsal fin. Upper surface of the head nearly smooth, the few ridges not being tuberculated. *Barbels*—nasal ones reach the hind third of the eye, maxillary ones the base of the caudal, external mandibular ones the first third of the pectoral, whilst the inner ones are shorter. *Teeth*—in an uninterrupted semilunar band across the palate. *Fins*—dorsal as high as the body, its spine very slender, only osseous at its base and articulated in its upper two-thirds: length of base of adipose dorsal equals that of the rayed fin, whilst the interspace between the two fins is of the same length. Pectoral as long as the post-orbital portion of the head, its spine moderately strong and 1/2 as long as the head, denticulated internally. Ventral nearly 1/2 as long as head and just extends to the anal. Upper caudal lobe with a filamentous prolongation. Free portion of tail 1/2 longer than high. *Colours*—of a light brown, shot with purple; fins darkest externally.

This fish is closely allied to *M. corsula*, but differs in the character of its dorsal spine, the length of its maxillary barbels, the smooth ridges on its head, occipital process, &c.

Habitat.—Burma, along the valley of the Irrawaddi.

9. Macrones cavasius, Plate C, fig. 1.

Pimelodus cavasius, Ham. Buch. Fish. Ganges, pp. 213, 379, pl. xi, f. 67.

Bagrus cavasius, Cuv. and Val. xiv, p. 409; Jacq. Voy. Ind. Poiss. pl. xvi, f. 2; Bleeker, Beng. en Hind. p. 113; Jerdon, M. J. L. and Sc. 1849, p. 337; Blyth, P. A. S. of Beng. 1858, p. 284, and 1860, p. 149.

Pimelodus seengtee, Sykes, Trans. Zool. Soc. ii, p. 374, t. 66, f. 2.

Macrones cavasius, Günther, Catal. v, p. 76.

Hypselobagrus cavasius, Day, Fish. Malabar, p. 188.

Vella kelletee and *Cutta*, Tam.; *Muti jella*, Tel.; *Guntea*, Ooriah; *Kavasi tengara*, Beng.; *Nga-zin-zine*, Burmese.

B. vi, D. $\frac{1}{7}$ | 0, P. 1/8, V. 6, A. 11-13 ($\frac{4}{7-9}$), C. 16.

Length of head 6 to $6\frac{1}{4}$, of caudal 6, height of body $5\frac{1}{2}$ in the total length. *Eyes*—diameter $3\frac{1}{4}$ to $3\frac{1}{2}$ in the length of head, 1 to $1\frac{1}{2}$ diameters from the end of snout, and $1\frac{1}{4}$ apart. The greatest width of the head equals its length excluding the snout. Snout rather obtuse, upper jaw a little the longer: width of the gape equals 2/5 of the length of the head, the cleft extends half-way to below the orbit. Upper surface of the head slightly roughened, its median longitudinal groove rather wide and extends to the base of the occipital process, which last is narrow and three or four times as long as wide at its base, and with a shallow groove along its last half or two-thirds: no interspace between its posterior extremity and the basal bone of the dorsal fin. *Barbels*—the nasal nearly or quite as long as the head, the maxillary extend to beyond the base of the caudal fin, the external mandibular almost to the base of the ventral, whilst the internal are as long as the head. *Teeth*—on the palate in an uninterrupted crescentic band. *Fins*—dorsal spine weak, entire, and nearly or quite as long as the head excluding the snout, the fin is rather higher than the body and pointed: the adipose dorsal commences just behind the rayed one, and the length of its base is three times as long. Pectoral spine as long as, but stronger than, the dorsal, smooth externally, denticulated internally. Ventral arises just posterior to the vertical from the last dorsal ray. Caudal pointed, upper lobe the longer. *Colours*—leaden superiorly, becoming yellowish along the abdomen and cheeks. Maxillary barbels, dorsal and caudal fins dusky: pectoral, ventral, and anal dull white. There is usually a black spot covering the basal bone of the dorsal fin. Occasionally there is a bluish band along the lateral-line.

I have a specimen from Lingasagore with a few serrations posteriorly on the dorsal spine.

Habitat.—From Sind, throughout India, Assam, and Burma: attaining at least 18 inches in length.

10. Macrones tengara, Plate CI, fig. 5.

Pimelodus tengara, Ham. Buch. Fish. Ganges, pp. 183, 377, and *Pimelodus batasius*, pl. 23, f. 60.*

Bagrus tengara, Cuv. and Val. xiv, p. 414; Bleeker, Beng. p. 114.

Kuttahrah, Hind.: *Ting-ga-rah*, Assam and Punj.: *Karaal*, Punj.

B. x, D. $\frac{1}{7}$ | 0, P. 1/8, V. 6, A. 11-13 ($\frac{2-3}{9-10}$), C. 19.

Length of head $4\frac{1}{3}$, of caudal $4\frac{1}{3}$, height of body $4\frac{1}{3}$ in the total length. *Eyes*—diameter $3\frac{1}{2}$ in the length of head, 3/4 to 1 diameter from the end of snout, and $1\frac{1}{2}$ apart. Greatest width of the head equals its length excluding the snout. Gape of mouth equal to 2/5 of the length of the head. Upper jaw slightly the longer. Median longitudinal groove extends to the base of the occipital process, which latter, (as well as the upper surface of the head), is corrugated and about thrice as long as wide at its base, it reaches the basal bone of the dorsal fin. *Barbels*—the nasal ones are nearly as long as the head, the maxillary ones reach

* Hamilton Buchanan distinctly figures this species here and not *P. batasius*, which is said to have its barbels shorter than the head, and which I have copied from his MSS., figure marked *P. batasi* (see Plate C. fig. 3). His figure Pl. iii, f. 61 is of the common Bengal form, having at least four barbels longer than the head, and cannot be the little up-country species which I have likewise figured: the names seem to have become transposed.

the base of the ventral, the external mandibular the base of the pectoral, whilst the internal are shorter. *Teeth*—in a narrow uninterrupted band across the palate. *Fins*—dorsal spine as long as the head excluding the snout, slightly serrated anteriorly in its upper third, and posteriorly in its whole extent: the length of the base of the adipose dorsal 1/3 less than that of the rayed fin, and equals 1/2 the length of the interspace between the two fins, in some specimens, as the one figured, it is much longer. Pectoral spine nearly as long as the head, stronger than that of the dorsal, smooth externally, and with about 13 denticulations internally. Ventrals arise on a vertical line just behind the last dorsal ray. Caudal forked, upper lobe the longer. *Colours*—brilliant yellow, with a black shoulder spot and about five black longitudinal lines. In some specimens the mandibular barbels are white with a black streak.

In this species the median longitudinal groove extends further backwards to the base of the occipital process, than in *M. vittatus*.

In some Punjab specimens (*? Pimelodus anisurus*, McClelland, Cal. J. N. Hist. ii, p. 583.) the nasal barbels are not so long as the head, whilst the maxillary only reach to the middle of the pectoral fin.

Habitat.—Northern India, the Punjab and Assam; attaining 3 to 4 inches in length. The specimen figured was from Assam.

11. Macrones oculatus, Plate XCVIII, fig. 4.

Bagrus oculatus, Cuv. and Val. xiv, p. 424; Jerdon, M. J. L. and Sc. 1849, p. 339.

B. x, D. $\frac{1}{7}$/0, P. 1/6, V. 6, A. 11-13 ($\frac{3}{8}$-$\frac{4}{9}$). C. 15.

Length of head $5\frac{1}{2}$, of caudal $4\frac{1}{3}$, height of body 5 in the total length. *Eyes*—diameter 3 to $3\frac{1}{2}$ in the length of head, about 1 diameter from end of snout and also apart. Profile from snout to dorsal fin rather elevated. Greatest width of the head equals its length excluding the snout: upper jaw slightly the longer. Summit of the head rough: median longitudinal groove extends nearly to the base of the occipital process, which last is three times as long as wide at its base, whilst there is no interspace between it and the basal bone of the dorsal fin. *Barbels*—the nasal half as long as the head, the maxillary reach the middle of the anal fin, the outer mandibular the middle of the pectoral, whilst the inner are rather shorter. *Teeth*—in an uninterrupted crescentic band across the palate. *Fins*—dorsal spine of moderate strength, as long as the head excluding the snout, two or three teeth anteriorly, serrated posteriorly: the length of the base of the adipose dorsal equals that of the rayed fin, but is about 1/4 less than the interspace between the two fins. Pectoral spine stronger than the dorsal, as long as the head behind the angle of the mouth, and with about 10 very strong teeth internally. Caudal deeply forked, the upper lobe being the longer. *Colours*—silvery, lightest beneath, a dark spot at the commencement of the base of dorsal fin, which is also black tipped, a darkish band likewise along the middle of the fin.

Habitat.—Malabar coast and the Coimbatore district: it attains 5 or 6 inches in length.

12. Macrones vittatus, Plate XCVIII, fig. 3; and Plate XCIX, fig. 4.

Silurus vittatus, Bloch. t. 371, f. 2; Bl. Schn. p. 387.

Pimelodus carcio, Ham. Buch. Fish. Ganges, pp. 181, 377; and *P. tengara*, pl. 3, f. 67.

? Pimelodus Indicus, McClelland, C. J. N. H. ii, p. 584.

Macrones tengara, Günther, Catal. v, p. 81; Day, Fish. Malabar, p. 189; Peters. Monats. Akad. Berlin. 1868, p. 271; (not *Pimelodus tengara*, H. B.)

Bagrus affinis. Jerdon, Madr. J. L. and Sc. 1849, p. 338.

Tengra, Beng.: *Kuggur*, Hind.: *Kel-le-tee*, Tam.: *Sukujellah*, Tel.: *Kuntiah*, Ooriah: *Mulleer* and *Kuggur*, Sind.: *Sin-go-rah*, Assam: *Nga-sa-ring*, Mugh.: *Nga-zin-yine*, Burmese.

B. x, D. $\frac{1}{7}$/0, P. 1/9, V. 6, A. 9-12 ($\frac{2}{7}$-$\frac{3}{9}$), C. 17.

Length of head $4\frac{3}{4}$ to 5, of caudal $5\frac{1}{2}$, height of body 5 in the total length. *Eyes*—diameter $4\frac{1}{2}$ to 6 in the length of head, $1\frac{3}{4}$ to 2 diameters from end of snout, and $1\frac{1}{2}$ to 2 apart. The greatest width of the head equals its length excluding the snout or behind the angle of the mouth, and is very little more than its height, in some specimens there is a considerable rise to base of first dorsal fin. Upper surface of the head roughened in tubercles hardly forming lines, median longitudinal goove reaches to midway behind the hind edge of the eye and the base of the occipital process, which latter is rough, three times as long as wide at its base, and a short (if any) interspace existing between it and the basal bone of the dorsal fin: radiating rough lines on the opercle: shoulder bone with its triangular portion a little longer than wide at its base, and roughened in raised lines. *Barbels*—the maxillary reach the ventrals, the nasal the opercle, the external mandibular the first third of the pectoral spine, whilst the internal are shorter. *Teeth*—in an uninterrupted semilunar band across the palate. *Fins*—dorsal 2/3 as high as the body, its spine half as long as the head with 2 or 3 teeth anteriorly in the young, whilst it is finely serrated posteriorly: length of the base of the adipose dorsal varies, in some specimens it usually equals that of the interspace between the two fins, and a little more than the length of the rayed fin. Pectoral spine strong, as long as the head excluding the snout, denticulated internally with about 16 coarse teeth. Ventral reaches from 1/2 to 2/3 of the distance to the base of the anal. Upper caudal lobe the longer. *Colours*—silvery or golden, old specimens at Madras (Pl. xcviii. f. 3) have a light bluish band along the middle of the side, and a narrow light one above and below it, a dark shoulder spot, and sometimes another near the base of the caudal fin. More to the eastward as Orissa and Bengal (Pl. xcix, f. 4) the colours are more vivid, usually of a golden hue, with a black shoulder spot, a narrow black band along either side of the

lateral-line, a lighter parallel one below, and two wider ones above. Sometimes these fish appear to be dark, with 5 longitudinal silvery bands. Tips of fins usually dark.

Bagrus affinis, Jerdon, is said to differ in its more depressed head, eye, if anything, smaller: dorsal spine barely notched, pectoral spine with 12 teeth.

This fish is termed "the fiddler" in Mysore: I touched one which was on the wet ground, at which it appeared to become very irate, erecting its dorsal fin and making a noise resembling the buzzing of a bee, evidently a sign of anger. Having put some small carp into an aquarium containing one of these fishes it rushed at a small example, seized it by the middle of its back and shook it like a dog killing a rat, at this time its barbels were stiffened out laterally like a cat's whiskers.

Habitat.—Throughout Sind, the continent of India, Assam, Burma, Siam, also Ceylon: it attains 7 or 8 inches in length.

13. Macrones leucophasis, Plate C, fig. 2.

Bagrus leucophasis, Blyth, Pro. A. S. of Bengal, 1860, p. 148.
Macrones leucophasis, Günther, Catal. v, p. 78; Day, Proc. Zool. Soc. 1873, p. 112.

B. xi, D. $\frac{1}{7}$ | 0, P. 1/8-10, V. 6, A. 11-12 ($\frac{3}{8\text{-}9}$), C. 17.

Length of head $4\frac{1}{2}$ to 5, of caudal $3\frac{1}{2}$ to $4\frac{1}{2}$, height of body $4\frac{1}{2}$ in the total length. *Eyes*—diameters 4 to 5 in the length of the head, $1\frac{1}{2}$ to 2 diameters from the end of snout, and 1 to $1\frac{1}{3}$ apart. The greatest width of the head equals its length behind the nostrils. Snout rounded, the upper jaw slightly the longer. Median longitudinal groove on the head does not quite reach the base of the occipital process, which last is twice as long as wide at its base, whilst between it and the basal bone of the dorsal fin is a pyriform bone about twice as long as wide. Upper surface of the head rather rugose. *Barbels*—the nasal ones reach to the front edge or the middle of the eye, the maxillary to the anal fin, the external mandibular to the middle of the pectoral, and the internal to the gill-openings. *Teeth*—in an uninterrupted crescentic band across the palate. *Fins*—dorsal spine moderately strong, as long as the head posterior to the nostrils or angle of the mouth, finely serrated posteriorly in its upper fourth; the adipose fin commences just behind the first dorsal, and the length of its base is from twice to two and a half times that of the base of the first dorsal. Pectoral spine much stronger than that of the dorsal, than which it is a little shorter, and denticulated internally. Caudal deeply forked, the lobes having filamentous prolongations. *Air-vessel*—large. *Colours*—purplish-black over body and fins: some white dots exist on the body.

Habitat.—Rivers of Burma, attaining a foot or more in length. Major Berdmore sent 4 or 5 specimens from Tenasserim to the Calcutta Museum. The specimen figured (life-size) was from Bassein. The native name *Nga-pet-lek* and *Nga-nouk-thawa* signifies "topsy-turvy" as it is believed to swim in that position.

14. Macrones montanus, Plate CI, fig. 4.

Bagrus montanus, Jerdon, M. J. L. and Sc. 1849, p. 337.

B. x, D. $\frac{1}{7}$ | 0, P. 1/6, V. 6, A. 12 ($\frac{3}{9}$), C. 19.

Length of head 5, of caudal 5, height of body 6 in the total length. *Eyes*—diameters $3\frac{1}{2}$ to 4 in the length of head, rather above 1 diameter from the end of snout, and $1\frac{1}{2}$ apart. A very slight rise in the profile from snout to base of first dorsal fin. Greatest width of the head equals its length behind the angle of the mouth. Upper jaw slightly the longer: the width of the mouth equals 2/5 of the length of the head. Upper surface of the head roughened in granulated lines which extend on to the occipital process. Median longitudinal groove extends to midway between the eye and the base of the occipital process, which last is narrow, about four times as long as wide at its base, and extends to the basal bone of the dorsal fin: opercle with roughened, radiating lines: shoulder bone rather longer than deep at its base and with roughened lines. *Barbels*—the nasal ones extend to rather behind the hind edge of the eye, the maxillary ones to the anal fin, the external mandibular to the end of the pectoral, whilst the internal are shorter. *Teeth*—in an uninterrupted crescentic band across the palate. *Fins*—dorsal nearly as high as the body, its spine rather weak, half as long as the head and posteriorly serrated: length of base of adipose dorsal one-third more than that of rayed fin which equals that of the interspace. Pectoral spine strong, as long as the head excluding the snout, and with about 16 strong denticulations internally. Ventral does not reach anal: upper caudal lobe the longer. *Colours*—silvery superiorly, with a tinge of yellow on the under surface of the head and along the abdomen, a bluish shoulder spot, and a silvery line along the side ending in a dark spot at the base of the caudal fin, one or two light bands along the side above the lateral-line: fins tinged with green.

Amongst Sir W. Elliott's figures was one of this species marked by Jerdon "*Bagrus* —— ? Manantoddy," taken in connection with the locality where I procured the fish, leaves but little room to doubt the identity of the two.

Bagrus agricolus, Jerdon, is said to have, A. 10, and maxillary barbels only reach the ventrals, to be found in the Wynaad, and no other essential differences are pointed out. (Madr. J. L. and Sc. 1849, p. 339).

Habitat.—Wynaad range of hills, and Manantoddy.

15. Macrones keletius, Plate XCVIII, fig. 3.

Bagrus keletius, Cuv. and Val. xiv, p. 411; Jerdon, M. J. L. and Sc. 1849, p. 337; (not Bleeker).
Macrones keletius, Günther (not synon.).

B. x, D. $\frac{1}{7}$ | 0, P. 1/10, V. 6, A. 9-10 ($\frac{2-3}{7-8}$), C. 17.

Length of head $4\frac{2}{3}$, of caudal 5 to $5\frac{1}{4}$, height of body 6 to $6\frac{1}{4}$ in the total length. *Eyes*—diameters $4\frac{1}{2}$ in the length of head, $1\frac{1}{2}$ diameters from the end of snout, and 2 apart. The greatest width of the head equals its length excluding the snout. Upper jaw slightly the longer. The upper surface of the head roughened in closely set tubercular lines continued on to the occipital process, opercle likewise striated with similar lines. Median longitudinal groove rather constricted in its centre, it reaches to opposite the hind border of the preopercle. Occipital process narrow, three times as long as wide at its base and does not quite reach the basal bone. *Barbels*—the nasal reach the opercle, the maxillary the middle of the anal fin, the external mandibular the end of the pectoral spine, whilst the internal are shorter. Humeral process rather short and pointed. *Teeth*—in an uninterrupted crescentic band across the palate. *Fins*—dorsal as high as body, its spine with two or three teeth anteriorly near its summit and serrated posteriorly, it equals 3/7 of the length of the head: length of the base of the adipose dorsal equals that of the rayed fin or of the interspace between the two. Pectoral reaches two-thirds of the way to the ventral, its spine is stronger than that of the dorsal and equals the length of the head excluding the snout. The ventral does not reach the anal. Upper caudal lobe the longer. A well marked pre-anal papilla. *Colours*—silvery along the back, becoming dull white beneath. A dark shoulder spot, a light band along the lateral-line, and a silvery one above and another below it, dorsal and caudal black tipped, anterior half of anal dark.

At the Jardin des Plantes I was allowed to examine one of *M. Leschenault's* Pondicherry specimens, still in excellent preservation. The anal papilla is very distinct.

Habitat.—Madras to Pondicherry and inland to Coimbatore, also Ceylon, attaining about 4 inches in length. Jerdon observes that it is also found in Mysore.

16. **Macrones Malabaricus,** Plate CI, fig. 2.

? Bagrus Malabaricus, Jerdon, M. J. L. and Sc. 1849, p. 338.
Hara Malabarica, Day, Fish. Malabar, p. 184, pl. xiii, f. 3.

B. x, D. $\frac{1}{7}$ | 0, P. 1/9, V. 6, A. 10-11 ($\frac{2-3}{8}$), C. 18.

Length of head $4\frac{3}{4}$ in a Wynaad specimen to $5\frac{1}{2}$, of pectoral 6 to 7, of caudal 5 to 6, height of body 6 to 7 in the total length. *Eyes*—diameters 4 to $4\frac{1}{2}$ in the length of head, $1\frac{1}{4}$ diameters from the end of snout, and $1\frac{3}{4}$ apart. Scarcely any rise in the dorsal profile from the snout to the base of the dorsal fin. Greatest width of the head equals its length behind the angle of the mouth. Upper surface of the head nearly smooth. Median longitudinal groove extends to midway between hind edge of the eye and the base of the occipital process, which last is about twice as long as wide, whilst there exists a considerable interspace between it and the basal bone of the dorsal fin. The triangular portion of the shoulder-bone curves rather upwards, and is 1/4 longer than deep at its base. *Barbels*—the nasal reach to a little behind the orbit, the maxillary to the middle or end of the ventral fin, the external mandibular to the end of the pectoral, whilst the internal are a little shorter. *Teeth*—in an uninterrupted crescentic band across the palate *Fins*—dorsal nearly as high as the body, its spine weak, finely serrated or almost entire posteriorly, and one denticulation anteriorly near its summit, its length equals that of the postorbital portion of the head: length of base of the adipose dorsal 1/3 more than that of the rayed fin, or of the interspace between the two fins. Pectoral spine strong and equal to the length of the head excluding the snout, internally with about eight or ten strong denticulations, whilst it is roughened externally. Upper caudal lobe the longer. *Colours*—deep leaden, usually with a dark blotch on the shoulder surrounded by a lighter edge, another at the base of the caudal fin: a dark band along the lateral-line, abdomen of a dull white. Fins with minute dark spots, making the upper portion of the dorsal and the lower third of the anal blackish.

Habitat.—Malabar coast of India and the Wynaad, attaining upwards of 6 inches in length. The specimen figured was from south Canara, where it extends inland to the ghauts.

17. **Macrones armatus,** Plate CI, fig. 3.

Hypselobagrus armatus, Day, Proc. Zool. Soc. 1865, p. 289, and Fish. Malabar, p. 187.
Cuaree, Mal.

B. x, D. $\frac{1}{7}$ | 0, P. 1/9, V. 6, A. 11 ($\frac{3}{8}$), C. 17.

Length of head $5\frac{1}{2}$, of caudal $5\frac{1}{2}$, height of body $5\frac{1}{2}$ in the total length. *Eyes*—diameters 5 in the length of head, $1\frac{1}{4}$ from end of snout, and 2 apart. A considerable rise from the snout to the base of the dorsal fin. The greatest width of the head equals its height or its length excluding the snout. Upper surface of the head roughened, the median longitudinal groove almost reaches the base of the occipital process, which last is about three times as long as wide and reaches the basal bone of the dorsal fin: shoulder-bone roughened in lines and 1/2 longer than deep at its base. *Barbels*—the nasal nearly reach the opercle, the maxillary the end of ventral fin, the outer mandibular the end of pectoral spine, whilst the internal are shorter. *Teeth*—in an uninterrupted crescentic band across the palate. *Fins*—dorsal as high as the body below it, its spine very finely serrated posteriorly or entire, and 4/9 of the length of head: length of base of adipose dorsal exceeds that of the rayed fin or of the interspace between the two. Pectoral spine strong, as long as the head excluding the snout, and having from ten to fourteen strong denticulations internally. Upper caudal lobe the longer. An anal papilla before the fin. *Colours*—leaden or brown superiorly, lighter

beneath, with or without a brown band along the side, and a dark blotch at the base of the caudal fin. Upper half of dorsal fin darkish, and a dark band along the anal.

This fish is allied to *M. Malabaricus*, differing in a higher body, more elevated dorsal profile, a higher dorsal fin, and an anal papilla.

Habitat.—Malabar and the Wynaad range of hills.

18. Macrones Bleekeri, Plate CI, fig. 1.

Bagrus keletius, Bleeker, Beng. en Hind. p. 115 (not Cuv. and Val.).
? *Bagrus tengara*, (var.) Blyth, P. A. S. of Beng. 1860, p. 149.
Macrones keletius, Günther, Catal. v, p. 84.

B. x, D. $\frac{1}{7}$ | 0, P. 1/9-10, V. 6, A. 9-10 ($\frac{3}{6-7}$), C. 17.

Length of head $5\frac{1}{4}$ to $5\frac{1}{2}$, of caudal $5\frac{1}{2}$, height of body 5 in the total length. *Eyes*—diameters $4\frac{1}{2}$ in the length of head, nearly 2 diameters from the end of snout, and $1\frac{1}{2}$ apart. Greatest width of the head equals its length behind the hind nostril, and equals its height. Snout somewhat obtuse. Width of the gape of the mouth nearly equals half the length of the head. Upper surface of head, opercles, occipital bone and humeral process granulated. Median longitudinal groove on the head shallow, and reaching to the base of the occipital process, which is twice as long as broad at its base, and reaches the basal bone of the dorsal fin. Occipital process not grooved, but with ridged lines. *Barbels*—nasal ones reach the hind edge of the eye, maxillary ones the anal fin, external mandibular ones the base of the pectoral, the internal ones a little shorter. *Teeth*—on the palate in an uninterrupted semilunar band. *Fins*—dorsal fin rounded, not so high as the body, the spine smooth and equal to half the length of the head, (in Sind specimens it is slightly serrated posteriorly and I once saw a specimen that had eight branched dorsal rays:) adipose dorsal commences just behind the rayed fin, and the length of its base is twice that of the head. Pectoral spine stronger than that of the dorsal, and as long as the head excluding the snout: denticulated internally. Caudal with pointed lobes, the upper being the longer. *Colours*—brownish-gray, with two light longitudinal bands, one above the other below the lateral-line, some specimens have a dark shoulder spot and a dark band along the middle of the anal fin. The fins are mostly darkest at their edge. In a specimen from Burma there is a dark spot at the end of the lateral-line and light longitudinal body bands.

Habitat.—Sind, Jumna, upper waters of the Ganges, and Burma, not attaining to a large size. It descends the rivers as low as Bengal.

Genus, 2—Leiocassis, *Bleeker.*

Rama, Bleeker; *Macrones*, pt. Günther.

Branchiostegals six. Gill-openings very wide, the membrane not being confluent with the skin of the isthmus, and notched as far as the chin. Mouth of moderate size, anterior, the upper jaw the longer. Nostrils distant one from the other. Eyes subcutaneous. Barbels six, a short maxillary and two mandibular pairs. Teeth villiform in both jaws, and in an uninterrupted band across the palate. One spine and six rays in the first dorsal; adipose fin present, it and the anal of moderate lengths. Ventral with six rays, situated posterior to the base of the dorsal: caudal forked. Air-vessel not enclosed in bone.

Geographical distribution.—Eastern Bengal and Assam to the Malay Archipelago.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Leiocassis rama*, A. 16. A dark shoulder mark. Body with short vertical dark marks. Eastern Bengal and Assam.

1. Leiocassis rama, Plate CXIV, fig. 2.

Pimelodus rama, Ham. Buch. Fish. Ganges, pp. 176, 377, pl. 3, f. 55.
? *Pimelodus chandramara*, Ham. Buch. l. c. pp. 162, 375.
? *Silundia chandramara*, Cuv. and Val. xiv, p. 52.
Silonia diaphina, Swainson, Fishes, ii, p. 306.
? *Batasio chandramara*, Blyth, P. A. S. of Beng. 1860, p. 150.
Rama Buchanani, Bleeker, Atl. Ich. Silur. p. 8.

B. vi, D. $\frac{1}{6}$ | 0, P. 1/9, V. 6, A. 16 ($\frac{3}{13}$), C. 18.

Length of head 4 to $4\frac{1}{2}$, of caudal $4\frac{1}{2}$, height of body $4\frac{1}{2}$ to 5 in the total length. *Eyes*—subcutaneous, diameters 3 to $3\frac{1}{4}$ in the length of head, 1 diameter from the end of snout, and also apart. The greatest width of the head equals its length excluding the snout. There is a considerable rise in the dorsal profile to the base of the rayed fin. Upper jaw the longer. Upper surface of the head covered with skin, a rather wide median longitudinal groove which extends up the first third of the occipital process, which is twice as long as wide at its base, and a distinct oval interneural shield exists between it and the basal bone of the dorsal fin. Scapular process well developed: humero-cubital process rather longer than high at its base. *Barbels*—a short maxillary pair, two pairs behind the symphysis of the lower jaw, *Teeth*—in an uninterrupted, semicircular villiform band across the palate. *Colours*—golden, with short, vertical, brown marks and a dark shoulder spot.

In Ham. Buch. MSS. *P. chandramara* is said to be found in the Rangpur district in the Mahánandá and also in the Dinajpur district. In Purniah he records it as termed *Thŭnka-pátasi* of the Kusí and *Khămăīn* at Bholáhát. In the "Fishes of the Ganges," he remarks that *P. rama* is from the Brahmaputra. The fish I have here described from the same locality, appears to be a link between the two forms, as the Assam one is said to have on the nape a large black spot divided into four lobes, and which is not present in my specimens, whilst it is stated to differ from *P. chandramara*, chiefly in the latter being deficient in this mark. I have referred my specimen to the *P. rama*, as it came from Assam.

Blyth, who appears to have seen H. B.'s figure of *Pimelodus chandramara*, now missing from the Calcutta series of drawings, observed "*B. chandramara* is referred to *Silundia* by Valenciennes, and is described by Hamilton Buchanan to have only two cirri; but his unpublished figure represents six cirri distinctly, and in all this group the minute cirri are discernible with difficulty and are extremely liable to be overlooked."*

Habitat.—Eastern Bengal and Assam. The specimen figured (twice life-size) was from Assam. This fish appears not to exceed 2 or 3 inches in length.

Genus, 3—Erethistes,† *Müll. and Trosch.*

Hara, Blyth.

Head osseous superiorly, somewhat depressed. Mouth small, terminal or sub-inferior, besides the occipital and humero-cubital processes there is a strong scapular one, none of which are covered by skin. Gill-openings narrow, the membranes being confluent with the skin of the isthmus. Eyes small, subcutaneous, not having a free orbital margin. Nostrils close together, separated by a barbel. Barbels eight, the maxillary ones with broad bases. Villiform teeth in the jaws, palate edentulous. First dorsal fin arising anterior to the ventrals, having an osseous, serrated spine and five or six branched rays: adipose dorsal present. Pectoral with a serrated spine. Air-vessel not enclosed in bone.

Geographical distribution.—From the Mahanuddee river in the West to the Salwein in British Burma. This genus extends inland to the Moora river at Bheer Bhoom in Bengal, to Assam (where in the Brahmaputra and waters in its vicinity the finest specimens are procured), and also as high as Mandalay in upper Burma. It has been reported from Chusan by McClelland.

SYNOPSIS OF SPECIES.

1. *Erethistes hara*, D. $\frac{1}{6}$ | 0, A. 10. Blunt spinate ossicles in the skin. Serrations on outer edge of pectoral spine, directed alternately forwards and backwards. No elongated caudal ray. Bengal, Assam, and Burma.

2. *Erethistes conta*, D. $\frac{1}{6}$ | 0, A. 10. Skin tuberculated. Serrations on outer edge of pectoral spine directed backwards. Upper caudal ray elongated. Bengal and Burma.

3. *Erethistes Jerdoni*, D. $\frac{1}{6}$ | 0, A. 10. Skin smooth. Serrations on outer edge of pectoral spine directed backwards. Spine elongated. No prolonged caudal ray. Sylhet.

4. *Erethistes elongata*, D. $\frac{1}{6}$ | 0, A. 10. Skin tuberculated. Head $6\frac{1}{2}$ in the total length. Dorsal spine serrated on both edges. Both caudal lobes elongated. Naga hills.

1. Erethistes hara, Plate CII, fig. 1 (*adult*), fig. 2 (*half-grown*).

Pimelodus hara, Ham. Buch. Fish. Ganges, pp. 190, 378; Cuv. and Val. xv, p. 152.

Erethistes pusillus, Müll. and Trosch. Horæ Ich. 1849, p. 12, t. i, f. 2; Günther, Catal. v. p. 263; Day, P. A. S. of Beng. 1872, p. 122.

Hara Buchanani, Blyth, P. A. S. of Beng. 1860, p. 152; Günther, Catal. v, p. 189; Day, P. Z. S. 1869, p. 369.

Nga-kyouk-pah, Burmese.

D. $\frac{1}{6}$ | 0, P. 1/6, V. 6, A. 10-11 ($\frac{3}{7\text{-}8}$), C. 15.

Length of head 4 to $4\frac{1}{2}$, of caudal 5, height of body $4\frac{1}{2}$ to 5 in the total length. *Eyes*—diameters about 10 in the length of head, situated in the commencement of the hind half of the head, 3 diameters apart. The greatest width of the head equals its length, and one-third or 1/4 more than its height. Upper jaw slightly the longer, the width of the mouth equal to 1/3 of the length of the head. A semilunar subcutaneous bone surrounds the anterior and lower margin of the nasal orifices, which are close together but divided by a barbel. Median longitudinal groove on the head shallow and reaches to opposite the hind edge of the eye. Occipital process from twice in the adult to about three times in the young, as long as wide at its base: humero-cubital process elongated and rugose, having two rounded osseous projections posteriorly: between the humero-cubital and occipital process is a third intermediate one, the scapular, directed somewhat downwards: the basal bone of the dorsal fin considerably dilated externally. *Barbels*—the nasal ones short, the maxillary ones reach the base of the pectoral fin, the mandibular ones arise on a transverse line, the external reach the gill-openings, whilst the internal are shorter. *Teeth*—none on the palate. *Fins*—dorsal spine stout, from 3/4 to nearly as long as the head (in the adult comparatively longest as is also the pectoral spine) serrated posteriorly, and sometimes rugose anteriorly: length of the base of the adipose dorsal 4/7 of that of

* So difficult is it to distinguish the minute barbels in this fish, that I have only been able to do so, by floating the specimens in water over a dark substance.

† See Proc. Asi. Society of Bengal, 1872, p. 122.

the rayed fin, equalling the length of the interspace between the two fins and 1/3 longer that high. Pectoral spine from as long as, to 1/4 longer than, the head, strong, flattened, denticulated internally and serrated externally, each alternate tooth (in many, especially small, specimens) being directed anteriorly or posteriorly, the fin reaches the ventral, and the latter the anal, this last being highest anteriorly. Caudal forked. *Skin*—covered with small, pointed elevations, which in the posterior part of the body are arranged in parallel lines, they are also seen on the cheeks. When captured the secretion from each of these orifices forms over them in rounded incrustations, causing the skin to appear tuberculated. *Air-vessel*—large and not enclosed in bone. *Colours*—yellowish-brown, banded or blotched with darker: fins with black bands or markings: all the barbels annulated with black.

Habitat.—Rivers and contiguous pieces of water from Orissa, through Bengal, Assam, and Burma, attaining at least $5\frac{1}{2}$ inches in length. The large specimen figured is from Suddya in Assam, the smaller from a specimen now in the Calcutta Museum. Those from the Naga hills are more deeply coloured, and the under surface of the chest is covered with the orifice of numerous glands.

2. **Erethistes conta,** Plate CII, fig. 5.

Pimelodus conta, Ham. Buch. Fish. Ganges, pp. 191, 379; Cuv. and Val. xv. p. 151.
Hara filamentosa, Blyth, P. A. S. of Bengal, 1860, p. 152; Günther, Catal. v, p. 189.
Hara conta, Günther, l. c.; Day, J. A. S. of Beng. 1870, p. 40, pl. iv, f. 3.
Nga-that-to (Upper Burma): *Nga-kouk-thwa* (Bassein) Burmese.

D. $\frac{1}{6}$/0, P. 1/6, V. 6, A. 11 ($\frac{3}{8}$), C. 17.

Length of head 5, of caudal $4\frac{1}{2}$, height of body $4\frac{1}{2}$ in the total length (excluding the filamentous prolongation of the upper lobe of the caudal fin. *Eyes*—diameters 8 in the length of the head, slightly behind the middle of the length of the head, and $2\frac{1}{2}$ diameters apart. The greatest width of the head rather less than its length. Upper jaw slightly the longer, median longitudinal groove on the head rather deep and extends to the base of the occipital process, which latter is three times as long as wide at its base: humero-cubital process elongated, rough, and with two rounded osseous projections posteriorly: between the humero-cubital and occipital process is a third intermediate one, the scapular, directed somewhat downwards: basal bone of the dorsal fin not dilated externally. *Barbels*—the nasal short, the maxillary as long as the head, the mandibular ones, which arise on a transverse line, shorter. *Fins*—dorsal spine strong, nearly as long as the head, rugose anteriorly, denticulated posteriorly: length of the base of the adipose dorsal equals that of the first dorsal fin, or the interspace between the two fins, it is 1/3 as high as long. Pectoral spine rather shorter than the head, denticulated internally, and with backwardly directed serrations externally. Caudal forked, its upper lobe having a filamentous prolongation. *Skin*—covered with smooth tubercles, most of which are on a rounded base. *Colours*—as in *E. hara*, except that the mandibular barbels do not appear ever to be annulated with black, and sometimes the maxillary ones are even destitute of colour.

Habitat.—Eastern Bengal, Assam, Burma as far as the Tenasserim province, from whence Major Berdmore sent 5 or 6 specimens to the Calcutta Museum. They are found as high as Prome, and I have also taken them at Bassein.

3. **Erethistes Jerdoni,** Plate CII, fig. 3.

Day, Journ. As. Soc. of Bengal, 1870, p. 37.

D. $\frac{1}{5}$/0, P. 1/6, V. 6, A. 10, C. 12.

Length of head $3\frac{3}{4}$, of caudal 6, height of body 4 in the total length. *Eyes*—in the anterior half of the head, 3 diameters from end of snout. Head 1/2 wider than high opposite the opercles. Median longitudinal groove extends nearly to the base of the occipital process where it terminates in a small depression. Occipital process half longer than wide at its base: cubito-humeral process of an elongated triangular shape having two prominent ossicles posterior to it; between these two processes is a third. *Barbels*—The maxillary reach the gill-opening, the others are shorter. *Fins*—dorsal spine half as long as the head, it is serrated posteriorly: the length of the base of the adipose dorsal is 2/3 that of the rayed fin. Pectoral spine flattened and rather exceeding the distance between the snout and the base of the dorsal fin, when laid flat it reaches as far as the posterior end of the ventrals, it has 12 strong denticulations internally, 26 smaller ones, directed backwards, externally. Caudal rays elongated. *Skin*—smooth. *Colours*—brownish, irregularly banded, barbels annulated with black.

Habitat.—Sylhet district, out of 3 specimens shown me by the late Dr. Jerdon, the largest was only 1·5 inches in length.

4. **Erethistes elongata,** Plate CII, fig. 4.

Hara elongata, Day, Proc. Zool. Soc. 1871, p. 704.

D. $\frac{1}{6}$/0, P. 1/6, V. 6, A. 10 ($\frac{3}{7}$), C. 17.

Length of head $6\frac{1}{2}$, of caudal 4, height of body 7 in the total length. *Eyes*—small, situated in the posterior half of the head. Occipital process three times as long as wide at its base. The scapular and cubito-humeral processes well developed, the last having an oval ossicle posterior to it. *Fins*—dorsal spine stout, as long as the head, anteriorly strongly denticulated, the teeth being directed downwards, also slightly serrated

posteriorly. Pectoral spine one fourth longer than that of the dorsal and serrated on both edges, most strongly internally. Ventral extends two-thirds of the distance to the anal: caudal deeply forked, its outer rays being prolonged. *Skin*—covered with tubular pores. *Colours*—brownish, banded with darker: fins yellow with black bands.

Habitat.—Naga Hills from whence the single specimen (figured life-size) was procured.

Genus, 4—Rita, *Bleeker.*

Gogrius, Day.

Branchiostegals eight. Gill-openings with a free posterior edge and not confluent with the skin of the isthmus. Mouth transverse, upper jaw the longer, nostrils on either side sub-contiguous, but the pair on one side widely separated from that on the other. Eyes subcutaneous, without free circular margins. Barbels six, a minute pair at the posterior nostrils, a maxillary and a mandibular pair. Teeth villiform in both jaws or mixed with molarform ones in the mandibles, molarform on the palate. One strong spine and six rays in first dorsal fin, the adipose and the anal of moderate lengths. Ventral posterior to the base of the dorsal, and having seven or eight rays: caudal forked. Air-vessel not enclosed in bone, with or without a posterior prolongation. The ova are much larger than in Macrones, but very much smaller than in Arius and its allies. A strong cubito-humeral process protects the pectoral spine when it is flexed along the side of the body.

Geographical distribution.—Large rivers of Sind, India (except its southern portions) and Burma far above Mandalay.

Uses—food for the lower classes. It retains life long subsequent to its removal from water, and can be conveyed fresh for long distances.

SYNOPSIS OF SPECIES.

A. *Some of the posterior teeth in the lower jaw molarform.*

1. *Rita Buchanani.* Eye, 8 to 10 diameters in length of head. Patches of teeth in palate wide apart. Dorsal spine in the adult as long or longer than the head, entire anteriorly. Indus and affluents, also Jumna, Ganges and Irrawaddi.

2. *Rita pavimentata.* Eye, 5½ to 6 diameters in length of head. Patches of teeth in palate close together. Dorsal spine as long as head excluding the snout, entire anteriorly. Deccan, throughout Kistna and its tributaries.

3. *Rita chrysea.* Eye, 4 diameters in the length of head. Patches of teeth in palate close together in their front halves. Dorsal spine longer than the head, coarsely serrated anteriorly in its whole extent. Orissa.

B. *Teeth in lower jaw villiform or cardiform.*

4. *Rita hastata.* Eye, 4½ to 5 diameters in length of head. Patches of teeth in palate wide apart. Dorsal spine as long or longer than the head, serrated anteriorly in its lower third. Deccan, throughout the Kistna and its tributaries.

A. *Some of the posterior teeth in the lower jaw molarform.*

1. Rita Buchanani, Plate CIII, fig. 1 (*semi-adult*), 2 (*immature*), and Plate CIV, fig. 2 (*young*).

Pimelodus rita, Ham. Buch. Fish. Ganges, pp. 165, 376, pl. xxiv, f. 53.
Arius ritoides, Cuv. and Val. xv, p. 92 (*young*).
Arius rita, Cuv. and Val. xv, p. 88, pl. 429.
Rita Buchanani, Bleeker, Prod. Silur. p. 65, and Beng. p. 123, t. 3, f. 1.
Rita crucigera, (Owen)* Günther, Catal. v, p. 92.
Nga-htway, Burmese.

B. viii, D. $\frac{1}{6}$/0, P. 1/10, V. 8, A. 12-13 ($\frac{4-5}{9}$), C. 19.

Length of head 4 to 4⅓, of caudal 5, height of body 5½ to 6 in the total length. *Eyes*—diameters 8 to 10 in the length of head, 3 diameters from the end of snout and 4½ apart. The greatest width of the head equals its length behind the nostrils, whilst its height is a little less. Upper surface of the head covered with skin except a strip anterior to the base of the occipital process, that bone, the scapular and cubito-humeral processes are granulated, the occipital process nearly as long as wide at its base, notched anteriorly to receive the basal bone of the dorsal fin and which is nearly as long as the occipital process. Upper jaw the longer: width of the mouth nearly equals half the length of the head. Cubito-humeral process more pointed in young than in adult specimens and about 3/4 the length of the head. *Barbels*—the nasal short: the maxillary nearly reach the end of the head, and the mandibular ones almost as far. *Teeth*—villiform in the upper jaw, also in the anterior portion of the mandible, and in an outer row along either ramus, whilst internally are two or three rows of rounded teeth, the most posterior of which are the largest: in two elliptical patches of rounded ones on the palate, which are wide asunder along the median line but coalesce anteriorly. *Fins*—dorsal spine very strong and slightly serrated posteriorly in its upper portion, its length varies being shortest in the immature,† it is generally as long as the head (except in the young) or even 1/3 longer in adults, especially in those from

* If the specific or even the generic name of Indian fishes given in Owen's Catalogue of specimens in the Museum of the College of Surgeons, or in his comparative anatomy, are to be admitted into Zoological literature, it will multiply synonyms without any corresponding advantage. Perhaps however this fish should be named *R. ritoides.*

† A specimen from Sind 2·8 inches long has the dorsal spine as long as head without the snout, and not reaching the base of the adipose fin.

the Indus: base of adipose fin 1/2 or 2/3 that of the rayed fin, or of the interspace between the two fins. Pectoral spine (except in the very young) somewhat shorter than that of the dorsal and denticulated on both edges. Ventrals arise just behind the vertical from the last dorsal ray. Anal 1/2 higher than its base is long. *Colours*—lurid green, lightest below, and the hind edge of the dorsal sometimes blackish. *Air-vessel*—with a thick outer covering, and of an almost quadrangular form, whilst posteriorly it is continued into two horn-like prolongations nearly as long as the abdominal cavity, the right one generally passing over to the left side and curving across the commencement of its fellow, whereas the left one passes backwards, and is then as a rule recurved on itself. On the inferior wall being removed a longitudinal median partition is seen in its posterior half, dividing it into two lateral chambers which anteriorly communicate together, whilst posteriorly they are continued down the two horn-like processes.

The type of *Arius ritoides*, C. V. is still at Paris in good preservation, it is nearly 6 inches in length and appears to be the young of this species, as seen in plate CIII, fig. 2. The dorsal spine reaches the commencement of the adipose fin and is longer than in *R. pavimentata*, with which species Dr. Günther unites it, but with a point of doubt.

Habitat.—Indus and affluent rivers, Jumna and Ganges, also the Irrawaddi: attaining at least 4 feet in length. The specimen figured (fig. 1) is 11 inches in length from Calcutta, the second (life-size) is from Lahore. This fish is esteemed as food by the natives, but is a very foul feeder.

2. Rita pavimentata, Plate CIII, fig. 3.

Arius pavimentatus, Val. in Jacq. Voy. Ind. Oriental, Atl. Poiss. pl. 17, f. 23; Cuv. and Val. xv, p. 94.
Phractocephalus gogra, Sykes, Trans. Zool. Soc. ii, p. 374, t. 66, f. 1.
Rita pavimentata, Günther, Catal. v, p. 93.
Gogrius Sykesii, Day, Proc. Zool. Soc. 1867, p. 563.
Banki yeddu, Tel.: *Pilah-gokundu*, Hind.

B. viii, D. $\frac{1}{6}$/0, P. 1/10, V. 8, A. 12-13 ($\frac{4}{8\text{-}9}$), C. 17.

Length of head $3\frac{3}{4}$ to 4, of caudal $6\frac{1}{2}$, height of body 6 in the total length. *Eyes*—covered by skin which however forms a rather free margin along its lower edge: diameters $5\frac{1}{2}$ to 6 in the length of head, 2 to $2\frac{1}{4}$ diameters from the end of snout and $2\frac{1}{2}$ apart. Greatest width of the head equals its length behind the angle of the mouth. Upper jaw the longer, the width of the mouth equals 3/10 of the length of the head. Upper surface of the head and occipital process smooth, being covered by skin. Occipital process rather more than twice as long as wide at its base, it is notched anteriorly to receive the V-shaped basal bone. Scapular process short, the cubito-humeral one pointed, as long as the head behind the middle of the eyes, or even a little longer, and roughened in lines. *Barbels*—the maxillary do not quite reach the posterior end of the head, the mandibular pair extend a little further: the nasal ones are very short. *Teeth*—in villiform or cardiform rows in both jaws: the posterior rows in the lower jaw, commencing behind the symphysis, with rounded crowns, their size augmenting laterally. Those in the palate in two semi-elliptical patches of rounded ones which are almost continuous along the median line, the posterior being much the largest. *Fins*—dorsal spine of moderate strength, as long as the head excluding the snout and finely serrated posteriorly in almost its entire extent: length of the base of the adipose 3/4 of that of the rayed fin and nearly equal to the extent of the interspace between the two fins. Pectoral spine stronger and a little longer than that of the dorsal, it is denticulated on both edges, it does not reach so far as the ventral fin. Anal rays appear to be sometimes deficient in number. *Colours*—of a dull yellowish colour, with dark or even black fins.

A drawing and description of this species exists amongst Sir W. Elliot's collection, the locality is not given, but it was probably from the Kistna, it is termed "*Ghogra*."

Habitat.—From Poonah and the rivers in the Deccan and affluents of the Kistna. The specimen figured (life-size) was from Kurnool.

3. Rita chrysea, Plate CIV, fig. 1.

B. viii, D. $\frac{1}{6}$ | 0, P. 1/9, V. 8, A. 12 ($\frac{2}{10}$), C. 18.

Length of head $4\frac{1}{4}$, of caudal $4\frac{1}{3}$, height of body 6 in the total length. *Eyes*—covered by the skin which however is a little reflected along its lower edge, diameters 4 in the length of the head, $1\frac{1}{4}$ diameters from the end of snout, and 1 apart. The greatest width of the head equals its length excluding the snout, its height is slightly less. Upper jaw the longer, the width of the mouth equals 4/13 of the length of the head. Upper surface of the head mesially and posteriorly, also the occipital and scapular processes, rough. Occipital process as wide at its base as it is long, notched anteriorly to receive the basal bone. Cubito-humeral process as long as the head excluding the snout. *Barbels*—nasal ones short, the maxillary reach the base of the pectoral fin, the mandibular slightly shorter. *Teeth*—villiform in both jaws, and two or three of the inner rows in the mandibles with globular crowns: in two patches of globular headed teeth on the palate, these patches converge anteriorly so as to touch one another in their front half. *Fins*—dorsal spine strong, reaching to about the middle of the adipose fin and nearly 1/2 longer than the head, it is coarsely serrated anteriorly in its whole extent, and very finely serrated posteriorly. Pectoral spine rather longer than the head and denticulated on both sides. Caudal deeply forked. *Colours*—yellowish, the ends of the fins stained grayish.

This appears to be the only form in India proper having the dorsal spine serrated anteriorly in its whole extent.

Habitat.—Orissa, where the single specimen (figured life-size) was captured.

B. *Teeth in both jaws, villiform or cardiform.*

1. Rita hastata, Plate CIII, fig. 4.

Arius hastatus, Val. in Jacq. Voy. Ind. Ori. Atl. Poiss. pl. 18, f. 2; Cuv. and Val. xv, p. 97.
Arius pumilus, Val. l. c. f. 1 (*young*).
Phractocephalus kuturnee, Sykes, Trans. Z. S. ii, p. 372, t. 65, f. 3.
Bagrus? kuturnee, Jerdon, M. J. L. and Sc. 1849, p. 340.
Rita hastata, Günther, Catal. v, p. 93.
Rita kuturnee, Günther, Catal. v, p. 93.

B. viii, D. $\frac{1}{6}$ | 0, P. 1/10, V. 7-8, A. 13-14 ($\frac{5}{8-9}$), C. 17.

Length of head $4\frac{1}{4}$ to $4\frac{2}{3}$, of caudal 5 to 6, height of body 6 in the total length. *Eyes*—covered with skin, pupil oval, diameters $4\frac{1}{2}$ to 5 in the length of head, $1\frac{1}{3}$ diameters from the end of snout, and 1 apart. Greatest width of the head equals its length behind the angle of the mouth: upper jaw the longer: the width of the mouth 3/8 of the length of the head. Upper surface of the head (except just anterior to the occipital process) covered with skin, the portion in front of the occipital process and the process itself with roughened lines, the latter half longer than wide at its base, anteriorly emarginate to receive the basal bone of the dorsal fin. Scapular process rough but not elongated. Cubito-humeral process as long as the head, sharply pointed posteriorly, and rugose in lines. *Barbels*—the maxillary reach the base of the pectoral fin, the mandibular to below the hind edge of the eye: the nasal ones short. *Teeth*—in villiform or cardiform rows in both jaws: in two elliptical patches on the palate, converging anteriorly, and widely asunder along the median line, they consist of pointed ones anteriorly and more granular ones behind. *Fins*—dorsal spine of moderate strength, as long as, or even longer than, the head, finely serrated posteriorly in its upper portion, and also anteriorly along its lower third: length of the base of the adipose dorsal 2/3 of that of the rayed fin: pectoral spine stronger and a little longer than that of the dorsal, denticulated on both edges: caudal forked. *Colours*—brownish along the back, silvery on the sides.

The type specimen of *A. hastatus*, Val. is about $4\frac{1}{2}$ inches in length and may have come from Poona where it is common, it has villiform teeth in the jaws.

Habitat.—Deccan, Poona, Tamboodra and Kistna rivers.

Genus, 5—Arius, *Cuvier and Valenciennes.*

Sciades, sp. and *Ariodes*, Müll. and Trosch.: *Hexanematichthys*, *Guiritinga*, *Hemiarius*, *Cephalocassis*, *Netuma* and *Pseudarius*, Bleeker.

Branchiostegals from five to six. Gill-membranes not confluent with the skin of the isthmus, and scarcely, or not notched. Head osseous superiorly, or covered with very thin skin. Eyes with free orbital margins. Mouth anterior: upper jaw generally the longer. Anterior and posterior nostrils placed close together, the latter being provided with a valve. Barbels six, one maxillary, and two mandibular pairs. Teeth in the jaws villiform: there are nearly always palatine, and sometimes vomerine ones, these may be villiform or granular. First dorsal with one spine and seven rays:† the adipose of moderate length or short: pectoral spine strong and serrated: ventral with six rays, situated behind the vertical from the posterior margin of the rayed dorsal fin: caudal forked or emarginate. An axillary pore. Air-vessel not enclosed in bone.*

Considerable stress has been laid in this genus upon the character of the teeth, and whether they are villiform or granular forms a good method of division. Further sub-divisions, as whether the groups are continuous or not so, appear unadvisable, because in some species the size of the patches of palatine teeth increase with age, thus altering their original conformation, and causing one patch to impinge on its neighbour.

There is likewise another question as regards the palatine teeth in these fishes, in *Arius jatius* there are usually two small patches of palatine teeth widely separated along the median line: but in some specimens such are entirely absent as stated by Hamilton Buchanan, and subsequently denied by others. The specimen figured has no trace of palatine teeth. *Arius tenuispinis* appears to me to be so similar to *A. Layardi*, Günther, excepting in having no palatine teeth, that I cannot help thinking they are identical, but have no series to confirm or disprove this supposition. Consequently genus *Hemipimelodus*,‡ Bleeker, has its representatives in India, but such are either abnormal specimens in which the palatine teeth were absent from birth, or else have become lost due to age. These species would appear to be such as have globular teeth.

The air-vessel is not enclosed in bone, is large, heart-shaped, and internally subdivided into five chambers, which communicate together anteriorly, the front one which is the largest occupies its anterior portion, behind it a median septum divides it down the centre, and lateral partitions subdivide the posterior chambers into four. (see *A. gagora*, p. 465.)

The breeding of these fishes is peculiar and deserves attention, the eggs of *Arius* are large, averaging about 0·5 to 0·6 of an inch in diameter and I found many males, also of *Osteogeniosus*, with from 15 to 20 of them

* Species destitute of palatine teeth belong to genus *Hemipimelodus*, Bleeker.
† Six in some South American species according to Valenciennes.
‡ Dr. Günther observes, "In species which have rudimentary vomerine teeth, these are sometimes entirely lost with age."

in their mouths. Some of these eggs were in an early stage of development, others nearly ready to be hatched: whilst in the mouth of one specimen was a hatched fry having the yolk bag still adherent. The eggs filled the cavity of the mouth and extended far back to the branchiæ.

In the female organs of generation the eggs seemed to come to maturity in batches of perhaps 50 at a time. On examining the conformation of the ventral fins, those of the females appeared to be larger than those of the males: the rays were thickened by a deposit of fat, whilst the innermost one had a large similar pad attached to its posterior edge. These fins can be expanded into a cup-like surface, the use of which may be to receive the eggs as extruded, which may be vivified there by the male.

Whether the male carries about these eggs in his mouth until hatched or only removes them when danger is imminent from some spot where he is guarding them is questionable, but in none of the specimens which I examined did I find a trace of food in the intestines of the males which had been engaged in this interesting occupation.

This has been observed likewise elsewhere by Mr. Boake in Ceylon, and Dr. Hensel has recorded the same of a Brazil species *A. Commersonii*: Dr. Günther of *Arius fissus* from Cayenne: and the same facts have been remarked in other Siluroid fishes.

Geographical distribution,—Seas and estuaries of tropical regions, ascending to within the tidal influence or even entering fresh waters. They appear to be almost as unknown in the Red Sea as the *Sciænidæ*, and probably due to the same cause (see p. 181).

Uses.—As food of an inferior quality. On the Western coast of India they are largely salted and a considerable amount of coarse isinglass is procured for export to China by drying their air-vessels.

SYNOPSIS OF SPECIES.

A. *Villiform teeth on the palate.*

1. *Arius Burmanicus*, A. 19-22. Head $3\frac{1}{2}$ to $3\frac{2}{3}$ in the total. Eye, 7 to $8\frac{1}{2}$ in length of head. Mouth spatulate. One patch of teeth not as large as eye on either side of palate. Burma.

2. *Arius nenga*, A. 19. Head $4\frac{1}{4}$ in total length. Eye, 6 in length of head. Maxillary barbels reach last third of pectoral fin. Two triangular patches of teeth approximating superiorly. Dorsal spine as long as head. Dull yellow, fins blackish. Hooghly at Calcutta.

3. *Arius cœlatus*, A. 19. Head $4\frac{1}{2}$ to $4\frac{2}{3}$ in the total. Eye, 6 to 9 in the length of head. Maxillary barbels reach middle of pectoral fin. Two somewhat triangular patches of teeth, approximating anteriorly. Dorsal spine about as long as head. Seas of India to the Malay Archipelago.

4. *Arius acutirostris*, A. 19. Head $3\frac{1}{2}$ in the total. Eye, 7 in the length of head. Snout much produced. Maxillary barbels reach hind edge of eye. Teeth in two obliquely ovate diverging patches. Dorsal spine half as long as head. Salwein river at Moulmein.

5. *Arius Sumatranus*, A. 18-19. Head $4\frac{1}{4}$ to $4\frac{1}{2}$. Eye, 5 in the length of head. Maxillary barbels reach end of head. Palatine teeth in two triangular patches diverging posteriorly. Dorsal spine not so long as head. Seas of India to the Malay Archipelago.

6. *Arius venosus*, A. 18-19. Head $5\frac{1}{6}$ in the total. Eye, $4\frac{1}{4}$ in the length of head. Maxillary barbels reach base of pectoral fin. Teeth on the palate in patches as large as the eye, of a triangular shape, as broad as long, and directed backwards. Dorsal spine as long as the head behind the angle of the mouth. Nicobars, &c.

7. *Arius parvipinnis*, A. 19. Head $4\frac{3}{4}$ in the total length. Eye, $5\frac{3}{4}$ in the length of head. Maxillary barbels reach the end of the pectoral fin. Palatine teeth in a pear-shaped patch, the small end forwards and converging, widely diverging posteriorly. Dorsal spine nearly as long as the head. Coromandel coast of India.

8. *Arius subrostratus*, A. 17-20. Head $3\frac{1}{4}$ to 4 in the total. Eye, 5 to 6 in the length of head, and $2\frac{1}{2}$ to 3 diameters from end of snout. Maxillary barbels do not quite reach the eye. Teeth on the palate in a patch on either side not longer than the eye, and wide asunder. Dorsal spine rather above half as long as head. Malabar.

9. *Arius sagor*, A. 17-19. Head $4\frac{1}{4}$ to $4\frac{1}{2}$ in the total. Eye, $6\frac{1}{2}$ to 7 in the length of head. Head very broad: basal bone of dorsal fin large and butterfly-shaped. Maxillary barbels reach middle or end of pectoral spine. Teeth in two confluent patches on either side meeting anteriorly. Dorsal spine as long as the head excluding the snout. Seas and estuaries of India to the Malay Archipelago.

10. *Arius sona*, A. 17. Head 4 in the total. Eye, 7 to 9 in the length of head. Maxillary barbels reach the end of the head. Palatine teeth on either side in a large triangular patch, emarginate posteriorly, and anteriorly conjoined by a small vomerine patch. Dorsal spine as long as the head excluding the snout. Seas and estuaries of India and Burma.

11. *Arius serratus*, A. 16. Head $5\frac{1}{4}$ in the total length. Eye, $4\frac{1}{2}$ in the length of the head. Maxillary barbels reach the middle of the pectoral fin. Teeth on the vomer and palatines in three patches on either side converging in the median line anteriorly. Dorsal spine as long as the head behind the middle of the eyes. Sind.

12. *Arius thalassinus*, A. 15-17. Head $4\frac{1}{2}$ to 5 in the total length. Eye, diameter 5 in the length of the head. Maxillary barbels reach base of pectoral fin. Teeth on vomer and palatines in three patches on either side joining anteriorly in the median line. Dorsal spine nearly or quite as long as the head. Red Sea, seas of India to the Malay Archipelago and beyond.

B. *Globular teeth on the palate.*

13. *Arius Buchanani*, A. 22. Head $4\frac{2}{3}$ in the total length. Eye, 7 to $8\frac{1}{2}$ in the length of head. The maxillary barbels reach the first third of the pectoral spine. Teeth on the palate in two oval patches placed far back. Dorsal spine as long as the head behind the angle of the mouth. Hooghly and Burmese rivers.

14. *Arius falcarius*, A. 18-20. Head 4 to 5 in the total length. Eye, $5\frac{1}{2}$ to 6 in the length of head. The maxillary barbels reach end of head. Teeth on palate in two semi-triangular patches, parallel along the median line. Dorsal spine as long as the head excluding the snout. Seas and estuaries of India to China.

15. *Arius Malabaricus*, A. 20. Head $4\frac{1}{4}$ in the total length. Eye, $6\frac{1}{2}$ in the length of head. Gape of mouth 2/5 of length of head. The maxillary barbels as long as the head. Teeth on palate in two oval patches well forwards and slightly convergent anteriorly. Dorsal spine as long as the head behind the angle of the mouth. Canara.

16. *Arius platystomus*, A. 19. Head 4 in the total. Eye, 7 in length of head. Width of gape of mouth 4/7 of the length of head. Maxillary barbels reach just beyond base of the pectoral. Teeth on palate in a pyriform band, placed well forward, slightly converging anteriorly. Dorsal spine as long as the head excluding the snout. Canara.

17. *Arius nella*, A. 19. Eyes small, in front half of head. Coromandel coast of India.

18. *Arius macronotacanthus*, A. 18-19. Head 4 to $4\frac{1}{6}$ in the total. Eye, $5\frac{1}{4}$ to 6 in the length of head. Maxillary barbels reach middle of pectoral spine. Teeth on palate in a pyriform band, placed well forwards, and widely divergent posteriorly. Dorsal spine as long as the head behind the nostrils. India to the Malay Archipelago.

19. *Arius gagora*, A. 18. Head 4 to $4\frac{1}{4}$ in the total length. Eye, 7 to 8 in the length of head. Maxillary barbels not quite so long as head. Teeth on palate in a large semi-ovate patch on either side nearly parallel with one another. Dorsal spine as long as the post-orbital portion of the head. Seas and estuaries of Orissa and Bengal to Siam.

20. *Arius jatius*, A. 18. Head $4\frac{1}{4}$ in the total length. Eye, $4\frac{1}{2}$ to 5 in the length of head. Maxillary barbels shorter than the head. Teeth in a small ovate patch posteriorly on either side or else absent. Dorsal spine as long as head excluding the snout. Estuaries and rivers of Bengal and Burma.

21. *Arius tenuispinis*, A. 18. Head $3\frac{1}{2}$ in the total. Eye, 7 in the length of head. Maxillary barbels as long as the head. Teeth on palate absent (? two pear-shaped globular patches normally). Bombay, ? Ceylon.

22. *Arius jella*, A. 17-18. Head $4\frac{3}{4}$ in the total. Eye, 6 in the length of head. Maxillary barbels nearly as long as the head. Teeth on palate in two convex, oblong, ovate, patches rather convergent behind. Dorsal spine as long as the head excluding the snout.

23. *Arius Dussumieri*, A. 14-16. Head 4 to $4\frac{1}{2}$ in the total. Eye, $6\frac{1}{2}$ in the length of the head. Maxillary barbels rather longer than the head. Teeth on the palate in two patches on either side. Dorsal spine as long as the head excluding the snout. Malabar and Ceylon.

A. *Villiform teeth on the palate.*

1. **Arius Burmanicus,** Plate CV, fig. 4.

Day, Proc. Zool. Soc. 1869, p. 618.

Nga-young, Burmese.

B. vi, D. $\frac{1}{7}$/0, P. 1/10, V. 6, A. 19-22 $(\frac{4-6}{15-16})$, C. 15.

Length of head $3\frac{1}{2}$ to $3\frac{2}{3}$, of caudal 5, height of body 7 in the total length. *Eyes*—without free orbital edges, diameter 7 to $8\frac{1}{2}$ in the length of head, $2\frac{1}{2}$ to 3 diameters from the end of snout, and $1\frac{1}{2}$ to 2 apart. Head depressed, snout spatulate, upper jaw the longer, the greatest width of head equals 2/5 of its length, whilst its height is less. The median longitudinal groove on the head narrow and does not extend so far as to the base of the occipital process which is keeled and rather wider at its base than it is long, whilst superiorly it reaches a V-shaped basal bone. Upper surface of the head with roughened lines which are closest together at the posterior end of the median groove and on the occipital process. *Barbels*—short, the maxillary do not quite reach the base of the pectoral fin, the outer mandibular are nearly as long. *Teeth*—those on the palate villiform in two small, oval, obliquely set, patches (not as large as the eye) and diverging posteriorly. *Fins*—the dorsal one-half higher than the body, its spine strong, half as long as the head, and serrated anteriorly and posteriorly: base of adipose dorsal about as long as that of the rayed fin. Pectoral spine of equal length, stronger, serrated on both edges. Ventral nearly reaches the anal. *Colours*—purplish, dashed with copper, becoming dull white on the sides and beneath. Both dorsal fins externally stained with black.

In external appearance this fish strongly resembles *Macrones aor*.

Habitat.—Tidal rivers of Burma as at Bassein and Moulmein. The specimen figured (from Moulmein) is 9 inches in length. It attains at least a foot.

2. **Arius nenga,** Plate CIV, fig. 3.

Pimelodus nenga, Ham. Buch. Fish. Ganges, pp. 171, 376.

Pimelodus auratus, Ham. Buch. MSS. figure.

Bagrus arioides, Cuv. and Val. xiv. p. 440.

Arius nenga, Bleeker, Beng. en Hind. p. 56.

Arius arioides, Bleeker, Beng. en Hind. p. 56; Blyth. Proc. As. Soc. of Beng. 1858, p. 286; Günther, Catal. v, p. 143.

B. vi. D. $\frac{1}{7}$/0, P. 1/10, V. 6, A. 19 ($\frac{6}{13}$), C. 17.

Length of head $4\frac{1}{4}$, of caudal 5, height of body 5 in the total length. *Eyes*—diameters 6 in the length of head, $2\frac{1}{4}$ diameters from the end of snout, and 3 apart. The greatest width of the head exceeds its height by 1/3, and is 1/6 less than its length. Upper jaw the longer, the width of the gape of the mouth equals half the length of the head. The median longitudinal groove on the head is shallow anteriorly but becomes narrow posteriorly and does not quite extend to the base of the occipital process, which latter is keeled, nearly as broad at its base as it is long: basal bone of dorsal fin narrow and crescent shaped. Upper surface of the head almost as far forwards as the eyes, and the occipital process studded with coarse granules. *Barbels*—the maxillary pair reach the posterior third of the pectoral fin, whilst the outer mandibular ones are as long as the head. *Teeth*—on the palate villiform in two triangular patches, approximating superiorly and parallel along the median line. *Fins*—dorsal much higher than the body, the dorsal spine strong, as long as the head, and having an elongated soft prolongation, it is granulated anteriorly in its lower half, serrated in its upper, posteriorly it is serrated: base of adipose dorsal nearly as long as that of the rayed fin. Pectoral fin almost reaches the ventral, its spine is nearly as long as the head, rough, granulated externally and denticulated internally. Upper caudal lobe the longer. *Colours*—of a dull yellow, the fins being externally stained with black.

This species is closely allied to *A. cælatus*, its maxillary barbel is longer, the dorsal spine more produced, and its colours different. It may be only a variety.

Habitat.—Hooghly at Calcutta from whence the specimen figured, life-size, was procured. Blyth says it attains 12 or 13 inches in length.

3. Arius cælatus, Plate CV, fig. 5.

Cuv. and Val. xv, p. 66; Bleeker, Atl. Ich. Silur. p. 35, t. 53; Günther, Catal. v, p. 158; Day, Malabar Fishes, p. 178.

Arius æquibarbis and *granosus*, Cuv. and Val. xv, pp. 68, 69; Bleeker, Beng. en Hind. p. 56.

Arius cælatoides, microgastropterygius, clypeaster, clypeastroides, chondropterygius and *melanopterygius*, Bleeker, Verh. Bat. Gen. xxi, Silur. Batav. pp. 32, 33, 34, 35, l. c. xxii, Madura, p. 10.

Cephalocassis cælatus, Bleeker, Ich. Arch. Prod. p. 110.

B. vi, D. $\frac{1}{7}$/0, P. 1/9, V. 6, A. 19 ($\frac{5-6}{14}$), C. 15.

Length of head $4\frac{1}{3}$ to $4\frac{2}{3}$, of caudal 5 to 6, height of body $6\frac{1}{2}$ in the total length. *Eyes*—diameters 6 to 9 in the length of the head, 2 to $2\frac{1}{2}$ diameters from the end of snout, and from 3 to 4 apart. Head broader than high, its greatest width being equal to its length posterior to the nostrils, the width of the mouth equals the postorbital length of the head or a little more. Upper jaw the longer, the angle of the mouth does not extend so far posteriorly as to below the orbit. Upper surface of the head and occipital process strongly granulated, the median longitudinal groove narrow and deep posteriorly and does not quite reach the base of the occipital process, which is a little keeled, as broad or slightly broader at its base than it is long, its anterior extremity slightly concave and reaches to the basal bone which is V-shaped and rather narrow. *Barbels*—the maxillary ones reach the middle of the pectoral fin, whilst the external mandibular ones are one-fifth shorter. *Teeth*—villiform in two somewhat widely separated triangular patches, the vomerine being confluent with the palatine ones. *Fins*—dorsal spine very strong especially in its lower half, which is granulated both laterally and anteriorly, serrated in its upper portion, also posteriorly in its whole extent, it is nearly or quite as long as the head and has a soft prolongation: base of adipose dorsal shorter than that of the rayed fin, and equals about half of the extent of the interspace between the two fins. Pectoral spine as strong as, but rather shorter than, that of the dorsal, it is granulated externally, serrated internally. Ventral does not reach the anal. Upper caudal lobe sometimes the longer. *Colours*—bluish along the back and sides, becoming white beneath. Adipose dorsal black, with its inferior and posterior margins yellow. Superior portion of dorsal, the end of the pectoral and ventrals black, as is also the anterior part of the anal.

Arius æquibarbis is said to have A. 22, its outer mandibular barbels as long as the maxillary one, and its caudal lobes 1/4 of the entire length, and coming from Bengal and Rangoon.

Habitat.—From Bombay through the Indian Seas to the Malay Archipelago, it is not uncommon at Calcutta. The specimen figured is 8 inches in length and from Moulmein: it attains a considerable size.

4. Arius acutirostris, Plate CVII, fig. 1.

B. v, D. $\frac{1}{7}$ | 0, P. 1/10, V. 6, A. 19 ($\frac{5}{14}$), C. 17.

Length of head $3\frac{1}{2}$, of caudal 6, height of body 7 in the total length. *Eyes*—diameters 7 in the length of head, $3\frac{1}{2}$ diameters from the end of snout, and 2 apart. The greatest width of the head equals about half its length, and is one-sixth more than its height. Snout fleshy and elongated, extending some distance beyond the mouth: mouth inferior, the extent of its gape equalling one-third of the length of the head. Upper surface of the head granulated, or with roughened lines. Median longitudinal groove on head does not extend to the base of the occipital process which is slightly keeled, rather longer than wide at its base, and reaches the narrow V-shaped basal bone of the dorsal fin. *Barbels*—short, the maxillary reach beyond the hind edge of the eye: the outer mandibular ones are about one-third of the length of the head, whilst the inner ones are shorter. *Teeth*—the villiform band in the premaxillaries is about 1/3 as deep as wide: those

on the palate likewise villiform in two somewhat obliquely oval patches diverging anteriorly. *Fins*—dorsal spine rather strong, half as long as the head and serrated on both sides: the length of the base of the adipose fin equals 2/3 of the length of that of the rayed fin. Pectoral spine of about the same length as that of the dorsal and serrated on both edges, the fin reaches 2/3 of the distance to the ventral, whilst the latter does not extend to the anal. *Colours*—upper portion of rayed and also of 2/3 of adipose dorsal black: pectoral, ventral, and anal stained gray.

Habitat.—The Salwein river at Moulmein in Burma. It attains a foot or more in length.

5. Arius Sumatranus, Plate CVII, fig. 6.

Bagrus Sumatranus, Bennett, Life of Sir S. Raffles, p. 691.
Arius Sumatranus, Günther, Catal. v, p. 162.

B. vi, D. $\frac{1}{7}$ | 0, P. 1/10, V. 6, A. 18-19 ($\frac{5}{13-14}$), C. 17.

Length of head $4\frac{1}{4}$ to $4\frac{1}{2}$, of caudal $5\frac{1}{4}$, height of body $5\frac{1}{2}$ in the total length. *Eyes*—diameters 5 in the length of head, $1\frac{3}{4}$ diameters from the end of snout, and 2 apart. The greatest width of the head exceeds its height and equals its length behind the angle of the mouth. Upper surface of the head with scattered granulations, which are more lineated on the occipital process. Median longitudinal groove becomes narrow posteriorly, nearly reaching the base of the occipital process, its edges in the last portion of its extent are raised. Occipital process slightly keeled, as broad at its base as it is long: basal-bone crescent shaped and narrow. *Barbels*—the maxillary ones reach end of the head, the outer mandibular ones the base of the pectoral fin. *Teeth*—in palate villiform, in two triangular patches diverging posteriorly. *Fins*—dorsal spine as long as the head behind the angle of the mouth, and serrated on both edges: base of adipose dorsal 2/3 of that of the rayed fin. Pectoral spine as long as the head excluding the snout, externally it is roughened in its lower, serrated in its upper portion, internally it is denticulated, it does not reach the ventral. Ventral reaches 2/3 of the way to the anal. *Colours*—bluish-green superiorly, becoming lighter on the sides and beneath: edges of fins stained gray, very little black on adipose dorsal.

This fish is closely allied to *A. venosus*, but has a longer head, &c.

In the type specimen, which is in a very bad state, the cubito-humeral process is larger than in my specimen, and the summit of the head is more granulated, and the palatine group of teeth is divided.

Habitat.—Andamans to the Malay Archipelago.

6. Arius venosus, Plate CVI, fig. 2.

Cuv. and Val. xv, p. 69; Bleeker, Silur. Batav. p. 39, and Atl. Ich. Silur. p. 33, t. 54, f. 1; Günther, Catal. v, p. 159.

Arius læviceps, *micruropterygius*, *manjong*, and *micronotacanthus*, Bleeker, Silur. Batav. pp. 36, 38.
Cephalocassis venosus, Bleeker, Prod. Silur. p. 113.

B. vi. D. $\frac{1}{7}$ | 0, P. 1/10, V. 6, A. 18-19 ($\frac{5-6}{13}$), C. 17.

Length of head $5\frac{1}{6}$, of caudal 5, height of body 6 in the total length. *Eyes*—diameters $4\frac{1}{4}$ in the length of head, $1\frac{1}{2}$ diameters from the end of snout, and 2 apart. Snout rather obtuse, and the upper jaw the longer: the width of the gape of the mouth equals 1/2 the length of the head. The greatest width of the head equals its length excluding the snout, and slightly exceeds its height. Upper surface of the head with scattered granulations, which are more numerous on the occipital process. Median longitudinal groove on the head shallow except in its posterior portion, which is narrow and deep as far as the base of the occipital process which is keeled, and as broad at its base as it is long. Basal bone V-shaped, and laterally narrow. *Barbels*—the maxillary ones extend to the base of the pectoral fin, the outer mandibular ones are shorter. *Teeth*—villiform on the palate, in two triangular patches, the points of which are directed backwards, the patches are about as large as the eye, as broad as long, and rather approximating anteriorly. *Fins*—the dorsal as high as the body, its spine rather strong and as long as the head behind the angle of the mouth, anteriorly it is serrated in its upper, granulated in its lower half, posteriorly it is serrated: base of adipose dorsal equals half that of the rayed fin. Pectoral spine as long as that of the dorsal, granulated and serrated externally, denticulated internally. The ventral reaches the anal: upper caudal lobe the longer.

This species differs from *A. Sumatranus*, more especially in having a comparatively much shorter head.

Habitat.—From Burma to the Malay Archipelago. The specimen figured was from the Nicobars.

7. Arius parvipinnis, Plate CXIII, fig. 1.

Silurus, Russell, ii, p. 52, and *Chinta jellah*, pl. 167.
? *Bagrus chinta*, Cuv. and Val. xiv, p. 445.
? *Arius chinta*, Bleeker, Beng. en Hind. p. 56.

B. vi, D. $\frac{1}{7}$ | 0, P. 1/10, V. 6, A. 19 ($\frac{5}{14}$), C. 18.

Length of head $4\frac{3}{4}$, of caudal $4\frac{1}{4}$, height of body 6 in the total length. *Eyes*—in anterior half of the head, diameters $5\frac{3}{4}$ in the length of head, $1\frac{2}{3}$ diameters from the end of snout, and 3 apart. Greatest width of the head equals its length behind the nostrils, and exceeds its height by 1/4. Upper jaw somewhat

the longer: the width of the gape of the mouth equals that of the postorbital length of the head. Upper surface of the head and occipital process studded with coarse granulations. Median longitudinal groove on head well marked, lanceolate, its last portion deep and not extending to so far as the base of the occipital process, which latter has a granulated keel along its centre, is as long as wide, and reaches a narrow crescentic basal bone. *Barbels*—the maxillary reach the end of the pectoral fin. *Teeth*—in two pear-shaped crescentic patches of villiform ones, placed well forwards, diverging, and their small end anterior. *Fins*—dorsal spine strong, laterally roughened, serrated anterior in its upper half, also posteriorly, it is as long as the head behind the angle of the mouth. Pectoral spine stronger, of the same length, and serrated on both edges, it reaches two-thirds of the distance to the ventral: the latter is very small, a little above half as long as the pectoral, and does not reach the anal. Caudal deeply lobed, with its upper one rather produced. *Colours*—on the upper surface dull leaden, sides and abdomen whitish, adipose dorsal with a black blotch: pectoral, ventral, and outer half of anal dark.

The only objection to considering this fish Russell's is, the teeth are villiform, it is evidently closely allied to *A. macronotacanthus*, which however has large pectoral and ventral fins.

Habitat.—Coromandel coast of India.

8. Arius subrostratus, Plate CVI, fig. 6.

Arius subrostratus, Cuv. and Val. xv, p. 62; Jerdon, M. J. L. and Sc. 1851, p. 146; Bleeker, Beng. en Hind. p. 58; Day, Fish. Malabar, p. 177.

Arius rostratus, Cuv. and Val. l. c. p. 63; Jerdon, l. c. p. 146; Bleeker, Beng. en Hind. p. 56.

B. vi, D. $\frac{1}{7}$/0, P. 1/9, V. 6, A. 17-20 ($\frac{5-6}{12-14}$), C. 17.

Length of head $3\frac{1}{3}$ to 4, of caudal 6 to 7, height of body 5 in the total length. *Eyes*—diameters 5 to 6 in the length of head, $2\frac{1}{2}$ to 3 diameters from the end of snout, and 2 to $2\frac{1}{2}$ apart. The greatest width of the head rather exceeds its height and equals 4/7 of its length. Snout elongated and a little depressed, the upper jaw the longer, the width of the gape equals 2/7 of the length of the head, depth of cleft short extending 1/3 of the distance to the orbit, median longitudinal groove on the head shallow, anteriorly becoming narrow, and posteriorly deep, it extends nearly to the base of the occipital process. Upper surface of the head behind the middle of the orbit granulated, as is also the occipital process which is rather wider at its base than it is long, has nearly straight lateral edges, and reaches the narrow basal bone of the dorsal fin. *Barbels*—short, the maxillary pair do not quite reach the eye, the outer mandibular are still shorter, and the internal the shortest. *Teeth*—those on the palate villiform, in two small patches wide asunder, on either side of the palate, not longer than the diameter of the eye. *Fins*—dorsal one-fourth higher than the body, its spine not very strong, rather above half as long as the head, rugose anteriorly, serrated posteriorly: length of the base of the adipose dorsal equals two-thirds of that of the rayed fin. Pectoral scarcely reaches the ventral, its spine is as long as, or a little longer than, that of the dorsal, serrated internally. Ventral reaches the anal, caudal forked. *Colours*—silvery-leaden colour along the back when fresh, a series of about 15 minutely spotted vertical bands are seen on the body. Fins stained with gray.

In Cuv. and Val. *A. rostratus* is stated to have the snout more elongated than in *A. subrostratus*; they both come from the Malabar coast, and any differences are perhaps due to the age of the specimens. In some young specimens the filamentous prolongation of the dorsal fin reaches almost to the base of the caudal.

Habitat.—Malabar coast of India to a foot in length.

9. Arius sagor, Plate CV, fig. 1.

Pimelodus sagor, Ham. Buch. Fishes of the Ganges, pp. 169, 376.

Bagrus Sondaicus, Cuv. and Val. xiv, p. 444; Bleeker, Silur. Batav. p. 29; Cantor, Catal. p. 255.

Bagrus Javensis, *sagor*, and *? doroides*, Cuv. and Val. xiv, pp. 445, 446, 447, pl. 418.

Hexanematichthys Sundaicus, Bleeker, Prod. Silur. p. 127, and Atl. Ich. Silur. p. 26, t. 62.

Arius sagor and *doroides*, Bleeker, Beng. en Hind. p. 56; Günther, Catal. v, pp. 141, 142; Kner, Novara Fische, p. 310.

B. vi, D. $\frac{1}{7}$/0, P. 1/10, V. 6, A. 17-19 ($\frac{3-4}{14-15}$), C. 15.

Length of head $4\frac{1}{4}$ to $4\frac{1}{2}$, of caudal 5 to 6, height of body 5 in the total length. *Eyes*—diameters $6\frac{1}{2}$ to 7 in the length of head, 2 diameters from end of snout, and $3\frac{1}{2}$ apart. Head depressed, much broader than high, its width equalling its length or a little less. Upper jaw the longer, the width of the gape of the mouth equalling 1/2 of the length of the head. The median longitudinal groove on the head shallow, extending to a little behind the posterior edge of the eye. Upper surface of the head granulated in radiating lines. Occipital process one-half wider at its base than it is long, its posterior extremity rounded where it meets the basal bone of the dorsal fin, which is large and somewhat butterfly-shaped. *Barbels*—the maxillary reach to the middle or end of the pectoral spine, the outer mandibular to its base or middle. *Teeth*—on the palate in two confluent villiform patches on either side, and meeting in the mesial line, each of these patches has a convex inner edge. *Fins*—dorsal higher than the body, its spine strong and as long as the head excluding the snout, granulated or serrated anteriorly, serrated posteriorly: the base of the adipose nearly as long as that of the rayed fin. Pectoral spine stronger and as long as that of the dorsal, serrated externally along its outer fourth and

denticulated internally, its outer ray often prolonged. Ventral nearly reaches the anal. Upper caudal lobe the longer. *Colours*—greenish-brown, becoming lighter on the abdomen, some specimens have narrow vertical bands of spots on the body. Fins tinged with dark.

Bagrus doroides has a few ossified plates along the first portion of its lateral-line.

Habitat.—From Bombay through the seas and estuaries of India to the Malay Archipelago. It is said to be very common at Batavia, where it is largely consumed. The specimen figured is 9 inches in length and from Calcutta: it attains at least 3 feet.

10. Arius sona, Plate CV, fig. 2.

Pimelodus sona, Ham. Buch. Fish. Ganges, 172, 376.

Bagrus gagoroides, and *trachipomus*, Cuv. and Val. xiv, pp. 441, 443.

Arius trachipomus, Bleeker, Beng. en Hind. p. 58.

Arius gagoroides, Bleeker, Beng. en Hind. p. 56; Blyth, P. A. S. of Beng. 1858, p. 285; Günther, Catal. v, p. 140.

Netuma netuma, Day, Fish. Malabar, p. 175 (not Cuv. and Val.)

Arius sona, Day, P. Z. S. 1871, p. 708.

B. vi, D. $\frac{1}{7}$/0, P. 1/12, V. 6, A. 17 ($\frac{6}{11}$), C. 17.

Length of head 4, of caudal 5 to 6, height of body 6 in the total length. *Eyes*—diameters 7 to 9 in the length of head, $2\frac{1}{2}$ to 3 diameters from the end of snout, and $3\frac{1}{2}$ to $4\frac{1}{2}$ apart. Head one-half broader than high, and almost as wide as long. Upper jaw the longer: the extent of the gape of the mouth equals two-thirds of the length of the head. Median longitudinal groove on the head wide but does not extend so far as the base of the occipital process, the latter being keeled, convex at its posterior extremity where it reaches the basal bone of the dorsal fin which is somewhat narrow, especially in its centre, whilst either side is slightly bent into an S-shaped form. The occipital process is as wide or rather wider at its base than it is long, it, and also the crown of the head from behind the eyes, are granulated, these granulations have somewhat of a radiating direction. *Barbels*—the maxillary reach to the end of the head, the outer mandibular ones are shorter. *Teeth*—on palate villiform, those on the palatines on a large somewhat triangular patch which is emarginate posteriorly, anteriorly two small patches on the vomer connect the two palatine ones together. *Fins*—dorsal spine strong, granulated anteriorly, serrated posteriorly, and as long as the head excluding the snout, but not so high as the rays which are higher than the body: length of the base of the adipose dorsal equals that of the rayed fin. Pectoral spine stronger and usually slightly shorter than that of the dorsal, rough externally, sometimes even with a few serrations near its tip, serrated internally. Ventrals not reaching the anal. Caudal forked. *Colours*—brownish above, bluish on the sides where it is glossed with gold, and of a dull white beneath. Fins with a bluish-black tinge. Young specimens are of a brownish colour, superiorly glossed with purplish and yellow, the fins are nearly black.

Bleeker, Atl. Ich. Silur. p. 36, considers *Arius gagoroides*=*Pimelodus arius*, H. B.=*Arius arius*, C. V. and *Pseudarius arius*, Bleeker, whereas I have considered them as four distinct species as follows, *Arius gagoroides*, C. V.=*P. sona*, H. B.: *Pimelodus arius*, H. B. is not *Arius arius*, C. V. but=*Arius Buchanani; Arius arius*, C. V.=*A. falcarius*, Richardson; *Pseudarius arius*, Bleeker=*Arius angulatus*, Bleeker, &c.

Habitat.—From Bombay through the seas of India, entering estuaries and tidal rivers. It attains at least three feet in length. The specimen figured is 7·5 inches in length and from Bombay.

11. Arius serratus, Plate XCV, fig. 3.

B. vi, D. $\frac{1}{7}$/0, P. 1/10, V. 6, A. 16 ($\frac{5}{11}$), C. 17.

Length of head $5\frac{1}{4}$, of caudal $4\frac{1}{4}$, height of body $5\frac{3}{4}$ in the total length. *Eyes*—diameters $4\frac{1}{2}$ in the length of head, $1\frac{1}{4}$ diameters from end of snout and 2 apart. The greatest width of the head equals its length behind the angle of the mouth. Upper jaw the longer, the width of the gape of the mouth equals half the length of the head. Upper surface of the head granulated or with rough lines, most distinct on the occipital process. Median longitudinal groove on the head does not quite reach posteriorly to above the hind edge of the opercle, from it commences a serrated ridge, which is continued along the occipital process. Occipital process with a serrated keel, a little longer than wide at its base. Basal bone narrow and crescent-shaped. *Barbels*—the maxillary ones reach to the middle of the pectoral fin, the outer mandibular ones to the gill-opening. *Teeth*—in the palate villiform in 3 distinct patches on either side, the vomerine patch round, small, and with an interspace between the two, and externally there is another rather longer oval patch. Posteriorly the third patch is parallel to the one on the opposite side. *Fins*—dorsal higher than the body, its spine which is serrated on both edges, is as long as the head behind the middle of the eyes, and has a soft termination: the length of the base of the adipose 1/2 of that of the rayed fin. Pectoral reaches rather above 1/2 way to the ventral, its spine stronger but not quite so long as that of the dorsal, externally it is rough in its lower, serrated in its outer half, internally it is denticulated. Ventral does not reach the anal. Upper caudal lobe the longer. *Colours*—upper surface of the head copper-coloured shot with gold, sides silvery. Fins yellowish, rayed dorsal stained with dark in its outer half: adipose fin with a black spot: a dark band, edged with white, along the outer half of the anal: either caudal lobe dark at its extremity.

This fish is nearly allied to *A. thalassinus*, but has much shorter pectoral fins, and longer maxillary

barbels. Whether the serrations along the occipital ridge are merely due to the specimen being young is questionable.

Habitat.—Sind, from whence the single specimen, figured life-size, was brought.

12. Arius thalassinus, Plate CIV, fig. 4, and Plate CVI, fig. 1.

Bagrus thalassinus, Rüpp. N. W. Fische, p. 75, t. 20, f. 2.
Bagrus bilineatus and *netuma*, Cuv. and Val. xiv, pp. 434, 438, pl. 417.
Arius nasutus, Cuv. and Val. xv, p. 60: Bleeker, Verh. Bat. Gen. xxi, Silur. Batav. p. 31 (*adult*).
Arius netuma, Bleeker, Beng. en Hind. p. 56.
Netuma nasuta, Bleeker, Prod. Silur. p. 95, and Atl. Ich. Silur. t. 61.
Netuma thalassina, Bleeker, l. c. p. 28.
Arius thalassinus, Günther, Catal. v, p. 139; Kner, Novara Fische, p. 310; Klunz. Verh. z. b. Ges. Wien, 1871, p. 589.
Arius Andamanensis, Day, Proc. Zool. Soc. 1870, p. 699.

B. vi, D. $\frac{1}{7}$ | 0, P. 1/12, V. 6, A. 15-17 ($\frac{3-5}{12-13}$), C. 17.

Length of head $4\frac{1}{2}$ to 5, of caudal 5, height of body $5\frac{1}{2}$ to 6 in the total length. *Eyes*—longest diameter obliquely transverse, 5 in the length of the head, $1\frac{1}{2}$ to $1\frac{3}{4}$ diameters from the end of snout, and $2\frac{1}{2}$ to 3 apart. Width of head equals its length behind the angle of the mouth, it is broader than high. Upper surface of the head granulated: the median longitudinal groove, which is narrow posteriorly, extends to opposite the hind edge of the opercle. The occipital process is granulated, keeled, rather longer than wide at its base, it extends to the basal bone of the dorsal fin, which is small and crescentic in shape. *Barbels*—the maxillary extend nearly or quite to the base of the pectoral fin, the outer maudibular are a little shorter. *Teeth*—on the palate villiform, those of each side forming a triangle composed of three patches, two in front and a larger one behind (Pl. civ, fig. 4 *b*). *Fins*—dorsal spine as long as the head without the snout, or even a little longer, granulated anteriorly (with some serrations in the young), serrated posteriorly: base of adipose dorsal 2/5 of that of the rayed fin. Pectoral spine strong, but a little shorter than that of the dorsal, rough externally, feebly serrated internally: caudal with the upper lobe usually the longer. *Colours*—silvery, darkest superiorly: the upper half of the adipose dorsal black. In some specimens the dorsal surface is of a rich brown, and each of the granules on the head appears to be tipped with gold.

In a stuffed specimen 27 inches in length the snout is much produced, a condition apparently normal in the adult of this species, the eye is 8 in the length of the head and situated in the commencement of the anterior half of the head. The teeth on the palate form an undivided patch.

Habitat.—From the Red Sea, through those of Africa and India to the Malay Archipelago and beyond, entering tidal rivers. It attains a large size. The specimen figured is 11 inches long, and from the Andamans.

B. *Globular teeth on the palate.*

13. Arius Buchanani, Plate CV, fig. 6.

Pimelodus arius, Ham. Buch. Fish. Ganges, pp. 170, 376.

B. vi, D. $\frac{1}{7}$ | 0, P. 1/10, V. 6, A. 22 ($\frac{6}{16}$), C. 17.

Length of head $4\frac{2}{3}$, of caudal $5\frac{1}{2}$, height of body $5\frac{3}{4}$ in the total length. *Eyes*—diameters $5\frac{1}{2}$ in the length of head, $1\frac{3}{4}$ diameters from end of snout, and $2\frac{1}{4}$ apart. Greatest width of the head equals its length behind the angle of the mouth. Upper jaw the longer, width of the gape of the mouth 3/8 of the length of the head. Median longitudinal groove on the head rather shallow, and does not reach the base of the occipital process. Upper surface of the head lineated in roughened lines, which are rather close together on the occipital process, which latter is scarcely keeled, and as wide at its base as it is long. Opercle higher than wide. *Barbels*—the maxillary ones reach to the first third of the pectoral fin, the outer mandibular ones almost to its base. *Teeth*—on the palate in two oval patches, one on either side, each as large as the eye, placed far back and parallel to one another, the teeth have large globular heads. *Fins*—dorsal higher than the body, its spine as long as the head behind the angle of the mouth, anteriorly roughened in its lower two-thirds, and serrated in its upper, posteriorly very feebly serrated: base of the adipose dorsal 3/4 of that of the rayed fin. Pectoral reaches the base of the ventral, the spine is stronger than that of the dorsal but of equal length, it is serrated on both sides. Ventral almost reaches the anal; upper caudal lobe the longer. *Colours*—silvery along the back, lighter on the sides and below, pectoral and dorsal edged posteriorly with blackish: adipose dorsal with a well defined black spot.

Habitat.—Hooghly at Calcutta and Burma. The specimen figured was from the Irrawaddi.

14. Arius falcarius, Plate CVI, fig. 5.

? *Arius arius*, Cuv. and Val. xv, p. 102; Bleeker, Beng. en Hind. p. 56, pt. not *Pseudarius arius*, Bleeker.
Arius falcarius, Richardson, Voy. Sulphur, Fish. p. 134, pl. 62, fig. 7-9.
Bagrus crinalis and *mong*, Richardson, Ich. China, pp. 282, 286.
Arius Schegelii, Bleeker, Ned. Tyds. Dierk. 1863, p. 146.

Arius Boakei, Turner. Journ. Anat. and Phy. 1866, i, p. 78.
? *Arius falcarius*, Günther, Catal. v, p. 168, and Fish. Zanz. p. 114.

B. vi, D. $\frac{1}{7}$ | 0, P. 1/10, V. 6, A. 18-20 ($\frac{5-6}{13-14}$), C. 17.

Length of head 4 to 5, of caudal 6, height of body $5\frac{1}{4}$ to 6 in the total length. *Eyes*—diameters $5\frac{1}{2}$ to 6 in the length of head, $2\frac{1}{4}$ diameters from the end of snout, and 3 to $3\frac{1}{2}$ apart. The greatest width of the head equals its length behind the angle of the mouth, and exceeds its height by about one-sixth. Upper jaw the longer, the width of the gape of the mouth equals 3/7 of the length of the head. The median longitudinal groove on the head, which is wide anteriorly, becomes suddenly narrow midway between the front edge of the eye and the hind edge of the opercle, it does not quite reach the base of the occipital process, which is keeled, rather longer than wide at its base, and reaches the basal bone of the dorsal fin which is V-shaped, narrow, and short. Upper surface of the head behind the eyes (except in groove) strongly granulated, as is also the occipital process. *Barbels*—the maxillary pair, which are black, reach to the hind edge of the head, the outer mandibular ones to the gill-opening, whilst the inner are shorter. *Teeth*—the villiform band in the premaxillaries four times as long as wide: those on the palate granular anteriorly, becoming globular posteriorly, in two elongated semi-triangular patches, longer than wide, they are parallel to one another along the median line, whilst their external edge is convex, anteriorly they nearly reach the premaxillary teeth. *Fins*—dorsal higher than the body, its spine usually ending in a soft point, it equals the length of the head excluding the snout, anteriorly it is serrated in its upper, rough in its lower half, it is serrated posteriorly: the base of the adipose fin equals 3/7 of that of the rayed fin. Pectoral spine a little longer than that of the dorsal, serrated externally in its outer half, rough along its lower, whilst internally it is denticulated, it nearly reaches the ventral, whilst the latter extends to the anal or even to as far as the third ray. *Colours*—bluish-gray superiorly, becoming dull white beneath: fins grayish, dorsal black tipped, a black blotch on the adipose dorsal, and sometimes one on the anal.

Habitat.—Calcutta, seas of India, to China. Very numerous along the Malabar coast.

15. Arius Malabaricus, Plate CVII, fig. 4 (*head*).

B. vi, D. $\frac{1}{7}$ | 0, P. 1/10, V. 6, A. 20 ($\frac{6}{14}$), C. 17.

Length of head $4\frac{1}{4}$, of caudal $5\frac{1}{2}$, height of body 5 in the total length. *Eyes*—diameters $6\frac{1}{2}$ in the length of head, $2\frac{1}{2}$ diameters from the end of snout, and $3\frac{1}{2}$ apart. The greatest width of the head equals its length behind the nostrils, it is rather wider than high. Upper jaw the longer, the width of the gape of the mouth equals 2/5 of the length of the head. Upper surface of the head sparingly granulated. The median longitudinal groove on the head commences opposite the hind edge of the eyes, is very narrow and deep, and is continued nearly to the base of the occipital process, which latter is slightly keeled and granulated, as broad at its base as it is long and emarginate posteriorly to receive the V-shaped basal bone of the dorsal fin. *Barbels*—the maxillary pair black, and as long as the head, the outer mandibular ones rather shorter. *Teeth*—in the upper jaw 1/4 as wide as long, those on the palate granular and in two elongated oval patches which reach far forwards, are slightly convergent anteriorly, whilst they extend some distance posteriorly. *Fins*—dorsal spine of moderate strength, as long as the head behind the angle of the mouth, anteriorly granulated in its lower, serrated in its upper portion, posteriorly serrated: base of soft dorsal rather short. Pectoral spine nearly as long as the head, denticulated internally, it extends to below the last dorsal ray. Ventral does not quite reach the anal. *Colours*—silvery, glossed with gold inferiorly: adipose dorsal with a black spot in its upper half.

The upper surface of the head is entirely destitute of the ridges seen in *A. gagora*.

Habitat.—Canara.

16. Arius platystomus, Plate CVII, fig. 3.

B. vi, D. $\frac{1}{7}$/0, P. 1/10, V. 6, A. 19 ($\frac{5}{14}$), C. 17.

Length of head 4, of caudal $5\frac{1}{2}$, height of body 5 in the total length. *Eyes*—diameters 7 in the length of head, 2 diameters from end of snout and 4 apart. The greatest width of the head exceeds its height by 1/3, and is as long as the head without the snout. Upper jaw the longer, the width of the gape of the mouth equals 4/7 of the length of the head. Median longitudinal groove on head becomes narrow posteriorly, where it just reaches the base of the occipital process which is strongly keeled, rather longer than wide at its base, with straight lateral edges, whilst it reaches the basal bone of the dorsal fin which is rather narrow and S-shaped. A very few scattered granulations over the posterior half of the head and the occipital process. *Barbels*—the maxillary ones reach just beyond the base of the pectoral, the outer mandibular ones are not quite so long. *Teeth*—the villiform band in the premaxillaries, six times longer than wide: obtusely conical in the palate in a pyriform patch, rather longer than broad, and which is placed well forwards, it is largest anteriorly where they slightly converge together, the interspace equals 2/3 of the diameter of the eye. *Fins*—the dorsal about as high as the body, its spine as long as the head excluding the snout, anteriorly its upper half is serrated superiorly, its lower roughened, it is serrated posteriorly: the length of the base of the adipose dorsal nearly equals that of the rayed fin. Pectoral spine rather shorter than that of the dorsal, externally serrated in its anterior, rough in its posterior half, internally it is denticulated, it reaches 3/4 of the distance to the ventral. Ventral just reaches the anal. *Colours*—bluish along the back, becoming

lighter on the sides and beneath: dorsal, pectoral, and ventral with a slight tinge of gray. No black mark upon the adipose dorsal.

The appearance of this fish, teething, etc. except black spot on adipose dorsal are like *Arius falcarius*, Richardson.

Habitat.—Canara.

17. Arius nella.

Silurus, Russell, Fish. Vizag. ii, p. 55, and *Nallah jellah*. pl. 170.

Pimelodus (?) nella, Cuv. and Val. xv, p. 162: Bleeker, Beng. en Hind. p. 58.

D. $\frac{1}{7}$/0, P. 1/10, V. 6, A. 19, C. 19.

Head broad, depressed. *Eyes*—small, in front half of the head. *Teeth*—on palate, globular. *Barbels*—the maxillary reach to the middle of pectoral fin. *Fins*—caudal sub-lunate. *Colours*—head and back bluish-leaden: belly, throat, and hinder part of the tail, a dull white. The whole trunk strewed with small, obscure, dusky dots. Dorsal, ventral, and anal with blackish margins. Pectoral and caudal glossy with a faint yellowish tinge.

This fish has been placed by Cuv. and Val. amongst those having no teeth in the palate, it being erroneously observed that in Russell "les détails de sa tête et de ses dentes n'étant pas indiqués." Dr. Günther probably due to this observation places the fish in genus *Hemipimelodus* stated to have "palate edentulous." But Russell observes "teeth, tongue, and palate as in the last," referring to No. 169, we find as I have observed under *Arius jellah*, the teeth are as in No. 168, where they are said to be "sub-granulous" and present on the palate.

Habitat.—Coromandel coast to $9\frac{1}{2}$ inches in length.

18. Arius macronotacanthus, Plate CXIII, fig. 1.

Bleeker, Silur. Batav. p. 32, and Atl. Ich. Silur. p. 32, t. 55; Günther, Catal. v, p. 169.

Cephalocassis macronotacanthus, Bleeker, Silur. p. 106.

Arius arius, Cantor, Catal. p. 258 (not *Pimelodus arius*, H. B.)

B. vi, D. $\frac{1}{7}$/0, P. 1/9, V. 6, A. 18-19 ($\frac{6-7}{12-13}$), C. 15.

Length of head 4 to $4\frac{1}{6}$, of caudal $6\frac{1}{2}$, height of body $5\frac{1}{2}$ in the total length. *Eyes*—diameter $5\frac{1}{4}$ to 6 in the length of head, $1\frac{1}{2}$ diameters from end of snout, and $2\frac{1}{2}$ apart. The width of the head exceeds its height, and equals its length excluding the snout. Extent of the gape of the mouth equals 4/9 of the length of the head. The median longitudinal groove is wide between the eyes, becomes pointed both anteriorly and posteriorly, and does not reach so far as the base of the occipital process, which latter is as wide at its base as it is long, and reaches a narrow V-shaped basal bone. Upper surface of the head granulated in groups, the occipital process densely so in lines. *Barbels*—the maxillary reach the middle of the pectoral spine, the outer mandibular ones its base. *Teeth*—on the palate obtusely conical or granular, placed in two pear-shaped patches as long as the eye, the large ends posterior and divergent, anteriorly they are near to the band on the premaxillaries. *Fins*—dorsal spine strong, very rugose laterally, as long as the head behind the nostrils, and serrated both anteriorly and posteriorly, it has a soft termination: the length of the base of the adipose equals 2/3 of that of the rayed fin. Pectoral spine as long as the head excluding the snout, roughened and serrated externally, denticulated internally, it reaches 2/3 the distance to the ventral which does not reach the anal. *Colours*—base of dorsal darkish, a large black blotch on the adipose fin.

This fish appears to be closely allied to *A. parvipinnis*, but differs in having smaller pectoral and ventral fins, and villiform teeth. In Bleeker's figure he gives villiform teeth, perhaps they become more obtuse with age. If so the two species would correspond, and also with Russell's *chinta*, the *Arius chinta*, C. V.

Habitat.—India to Java, Sumatra, and Pinang.

19. Arius gagora, Plate CVII, fig. 2.

Pimelodus gagora, Ham. Buch. Fish. Ganges, pp. 167, 376, pl. 10, f. 54.

Arius gagora, Cuv. and Val. xv, p. 99; Bleeker, Beng. pp. 56, 119; Blyth, P. A. S. of Beng. 1858, p. 285; Günther, Catal. v, p. 168.

Arius macracanthus, Günther, Catal. v, p. 167.

? *Arius jatius*, Lütken, Vid. Medd. 1874, p. 207.

B. vi, D. $\frac{1}{7}$/0, P. 1/10, V. 6, A. 18 ($\frac{5-6}{13-12}$), C. 17.

Length of head 4 to $4\frac{1}{4}$, of caudal $5\frac{1}{2}$ to $5\frac{2}{3}$, height of body $6\frac{3}{4}$ in the total length. *Eyes*—diameter 7 to 8 in the length of head, $2\frac{1}{2}$ diameters from the end of snout, and 3 to $3\frac{1}{2}$ apart. Head 1/4 wider than high, its width equals its length excluding the snout. Upper jaw the longer, the width of the gape of the mouth 4/11 of the length of its head. Most of the occiput and the whole of the occipital process granulated. Median longitudinal groove on the head narrow, rather deep, and extending nearly to the base of the occipital process, which latter is keeled, very slightly longer than wide at its base and reaches a narrow V-shaped basal bone. Opercle higher than wide. *Barbels*—the maxillary ones not quite so long as the head, the outer mandibular reach

the gill-opening. *Teeth*—those on the palate with globular heads, in large semi-ovate patches: considerable variation in size and direction of these patches of teeth exists, as it not unfrequently happens that some are wanting. *Fins*—dorsal rather higher than the body, the spine of moderate strength, anteriorly serrated in its upper, rough in its lower half, posteriorly serrated, it is as long as the postorbital portion of the head: length of the base of the adipose dorsal 2/3 of that of the rayed fin. Pectoral reaches two-thirds of the distance to the ventral, its spine is rather stronger than that of the dorsal which it equals in length, externally it is serrated, internally denticulated. Ventral does not extend so far as the anal. Upper caudal lobe the longer. *Colours*—purplish superiorly, becoming dull white beneath, fins externally stained with gray or black, and a blackish spot on the adipose dorsal. *Air-vessel*—Taylor described the air-vessel of *Gagata typus* as that of *Arius gagora*: Owen appears to have followed him, and (Comp. Anat. i, p. 491) observes that amongst fishes this organ is "seldom divided lengthways into two halves as in *Arius gagora*." . . . . "The divided air-bladder of the . . . . *Arius gagora*, in which the divisions are confined to the forepart of the abdomen and are enclosed in osseous caps developed from the anterior trunk vertebra." (See *Gagata typus*, Bleeker). I have found it in this species as follows: large and somewhat heart-shaped. On removing its lower wall a longitudinal septum is seen in its posterior half but does not exist anteriorly. It has three transverse subdivisions, forming it into five chambers, the anterior of which is nearly half the size of the entire organ, it having no longitudinal septum. The four lateral chambers communicate freely with one another on either side, also anteriorly with the large chamber.

Habitat.—Seas, estuaries and tidal rivers of Orissa and Bengal to Siam. It attains $1\frac{1}{2}$ feet (or according to Hamilton Buchanan 3 feet) or more in length: it is commonly seen about 8 or 10 inches long. The specimen figured (10 inches long) was from Calcutta.

20. Arius jatius, Plate CVI, fig. 4.

Pimelodus jatius, Ham. Buch. Fish. Ganges, pp. 171, 376; Bleeker, Beng. en Hind. p. 58.
Arius jatius, Blyth, Proc. As. Soc. Beng. 1860, p. 151.
Nga-youn and *Nga-yeh*, Burmese.

B. vi, D. $\frac{1}{7}$ | 0, P. 1/10, V. 6, A. 18 ($\frac{5}{13}$), C 17.

Length of head $4\frac{1}{4}$, of caudal 5, height of body $5\frac{1}{4}$ in the total length. *Eyes*—diameter $4\frac{1}{2}$ to 5 in the length of head, $1\frac{1}{2}$ diameters from the end of snout, and $1\frac{3}{4}$ to 2 apart. Height of head nearly equals its width, the latter equals its length excluding the snout. Upper jaw the longer: the extent of the gape of the mouth equals one-third of the length of the head. Summit of the posterior portion of the head sparingly granulated, the occipital process more thickly so. The median longitudinal groove on the head narrow, and continued almost to the base of the occipital process, which latter is keeled, as wide at its base as long, and reaches the narrow V-shaped basal bone of the dorsal fin. Opercle wider than high. *Barbels*—short, the maxillary pair shorter than the head, the outer mandibular pair just reach the gill-opening. *Teeth*—villiform, in a band six times as long as wide in the premaxillaries: on the palate globular, in a small oval patch posteriorly, scarcely exceeding half the diameter of the eye; they may be entirely absent. *Fins*—dorsal as high as the body, its spine strong, as long as the head excluding the snout, serrated on both sides: the base of the adipose dorsal 4/5 of that of the rayed fin. Pectoral spine as long as that of the dorsal, serrated externally, denticulated internally, it reaches as far as the ventral fin and the latter the anal. *Colours*—of a dark bluish along the back, becoming lighter on the sides and beneath. Fins yellowish, lower half of dorsal stained with gray. Upper edge deep black. A deep black spot on the upper half of the adipose fin, caudal edged with black, and anal with a dark spot on its edge near the middle.

This fish is very closely allied to *A. gagora*, but it has larger eyes, &c. The specimen figured has no teeth whatever on the palate and is an *Hemipimelodus*, but having closely compared it with four more specimens having teeth as described, I feel convinced of their identity.

Habitat.—Estuaries and rivers of Bengal and Burma, ascending far above tidal reach. It attains a foot or more in length.

21. Arius tenuispinis, Plate CVII, fig. 5 (*head*).

? *Arius Layardi*, Günther, Ann. and Mag. Nat. Hist. 1866, p. 473, pl. xv.

B. vi, D. $\frac{1}{7}$ | 0, P. 1/10, V. 6, A. 18 ($\frac{5}{13}$), C. 17.

Length of head $3\frac{1}{2}$, of caudal $4\frac{1}{2}$, height of body $5\frac{1}{2}$ in the total length. *Eyes*—diameter 7 in the length of head, $2\frac{1}{2}$ diameters from end of snout, and $3\frac{1}{2}$ apart. The greatest width of the head equals its length excluding the snout. The extent of the gape of the mouth equals one-third of the length of the head. Median longitudinal groove on the head narrow, and does not quite reach the base of the occipital process, which has a slight keel, is a little longer than wide at its base, and rather convex posteriorly where it reaches a narrow and V-shaped basal bone of the dorsal fin. A few granulations on the top of the head, also along the middle of the occipital process. *Barbels*—the maxillary ones reach the end of the head, the outer mandibular ones are 1/3 shorter. *Teeth*—none on the palate. *Fins*—dorsal spine very weak and thin, nearly as long as the head excluding the snout, serrated posteriorly: base of the adipose equals half that of the rayed dorsal fin. Pectoral spine as long as the dorsal, but slightly stronger, roughened externally, serrated internally. Caudal forked. *Colours*—silvery along the back, becoming lighter on the sides and beneath.

The single specimen procured was not in a very good state of preservation, it appears to be a distinct *Hemipimelodus*, provided such are not adult specimens of *Arius* which have lost their palatine teeth, or examples in which such teeth were abnormally deficient during the whole of their existence.

Arius Layardi, Günther, from Ceylon, were it not that it has two pear-shaped patches of granular teeth placed far back, agrees with the above, but a series of examples is necessary to prove whether they are identical or not.

Habitat.—Bombay, (the single specimen obtained 14 inches in length), and perhaps Ceylon.

22. Arius jella, Plate CVI, fig. 3.

Silurus, Russell, ii, p. 54, and *Deddi jellah*, pl. 169.

B. vi, D. $\frac{1}{7}$ | 0, P. 1/10, V. 6, A. 17-18 ($\frac{4-5}{13}$), C. 19.

Length of head $4\frac{3}{4}$, of caudal $5\frac{1}{2}$, height of dorsal fin $5\frac{1}{3}$, of body $6\frac{3}{4}$ in the total length. *Eyes*—diameter 6 in the length of head, 2 to $2\frac{1}{2}$ diameters from the end of snout, and 3 apart. Greatest width of the head 1/6 more than its height, and equals its length behind the nostrils. Upper jaw the longer, the extent of the gape of the mouth equals 3/8 of the length of the head. The median longitudinal groove becomes narrow and deep posteriorly, and reaches nearly to the base of the occipital process, which is slightly keeled, has nearly straight sides and is slightly longer than broad, posteriorly it is a little emarginate and reaches the narrow basal bone of the dorsal fin. Most of the occiput and the occipital process are closely granulated. *Barbels*—the maxillary are nearly as long as the head, the outer mandibular ones almost reach the gill-opening, whilst the inner are shorter. *Teeth*—on the palate in two convex, oblong-ovate patches of globular ones, which are rather convergent behind: none on the vomer. *Fins*—dorsal spine of moderate strength, as long as the head excluding the snout, sometimes with a very long soft termination, slightly serrated anteriorly, or merely rough in large specimens, strongly so posteriorly. Pectoral spine stronger than that of the dorsal and rather longer, roughened and slightly serrated externally, denticulated internally. Base of adipose dorsal slightly shorter than that of the rayed fin. Ventral scarcely reaches the anal. Upper caudal lobe the longer. *Colours*—grayish-silvery, becoming white on the sides and below. Fins stained gray, with a white outer edge to the anal. Adipose dorsal with a dark blotch.

In Cuv. and Val. it is suggested that Russell's fish is *Arius bilineatus*, C. V., Bleeker, &c. which has villiform teeth, and this error has been continued subsequently. Russell observes "teeth on the palate as before described in 166." Number 166 is the *Plotosus arab*, which he observes has "teeth in several rows, in the anterior part of the jaws (palate) small, sub-granulous: in the upper jaw very minute," p. 51.

In Cuv. and Val. it is observed that their fish came from Pondicherry, that it much resembles *A. gagora*, and has A. 18, it is therefore unlikely to be *Pimelodus arius*, H. B. having A. 22.

Habitat.—Coromandel coast of India. The specimen figured was from Madras.

23. Arius Dussumieri, Plate CVII, fig. 7.

Cuv. and Val. xv, p. 84; Bleeker, Beng. en Hind. p. 56; Günther, Catal. v, p. 163.
? *Arius Belangerii*, Cuv. and Val. xv, p. 71; Bleeker, Beng. en Hind. p. 56.

B. vi, D. $\frac{1}{7}$ | 0, P. 1/12, V. 6, A. 14-16 ($\frac{4-5}{10-11}$), C. 17.

Length of head 4 to $4\frac{1}{2}$, of caudal 5, height of body 5 in the total length. *Eyes*—diameter $6\frac{1}{2}$ in the length of head, $2\frac{1}{3}$ diameters from the end of snout, and 4 apart. Head one-fourth wider than high, its width equals its length excluding the snout, or even behind the angle of the mouth. Upper jaw the longer, the width of the gape of the mouth equals 4/9 of the length of the head. Median longitudinal groove shallow, becoming most distinct posteriorly, where it reaches the base of the occipital process, which is strongly keeled and nearly (or quite) as wide at its base as it is long, its lateral edges are nearly straight, whilst it extends to the basal bone which is narrow and S-shaped. A few scattered granulations on the posterior portion of the head, and over the base of the occipital process. *Barbels*—the maxillary ones reach just beyond the base of the pectoral, the external mandibular are not quite so long. *Teeth*—obtusely conical on the palate, in four widely separated patches, those on either side of the vomer being smaller than the palatine patches. *Fins*—the dorsal as high as the body, the spine as long as the head excluding the snout, anteriorly in its upper half serrated, in its lower roughened, it is serrated posteriorly: the length of the base of the adipose dorsal equals half of that of the rayed fin. Pectoral spine rather shorter than that of the dorsal, externally it is serrated in its anterior half, rough in its posterior, whilst internally it is serrated, it reaches 2/3 of the way to the ventral. Ventral just reaches the anal. *Colours*—bluish along the back, becoming lighter on the sides and below, fins blackish externally.

In Cuv. and Val. xv, p. 161, is *Pimelodus* or *Hemipimelodus Peronii*, marked as from India, but with the further observation that the locality from whence it was procured is not recorded. It has A. 16. Head 5 in the total. The maxillary barbels scarcely extending beyond the opercle. It may be this species from which the palatine teeth are absent. It would seem that absence of palatine teeth is more general in East Indian species in those forms in which they are normally globular, than those in which they are villiform when present.

Habitat.—Malabar coast of India and Ceylon. Specimen figured 9·8 inches in length and from Malabar.

Genus, 6—Batrachocephalus, *Bleeker*.

Branchiostegals five. Gill-membranes united at the throat, without a notch, not confluent with the skin of the isthmus. Cleft of mouth wide: lower jaw the longer. Eyes with a free circular margin. Nostrils approximating, the posterior provided with a valve. Barbels two, rudimentary, and inserted at the chin. Teeth obtusely conical in either jaw, with an interspace between the outer and the inner rows, in a broad longitudinal band on the palate: none on the vomer. Dorsal fin with one spine and seven rays, inserted anterior to the ventrals: adipose fin short. Anal of moderate length, not confluent with the caudal which is forked. Ventral with six rays, Air-vessel in the abdominal cavity not enclosed by bone. An axillary pore.

Geographical distribution.—From Beloochistan through the seas, estuaries, and tidal rivers of India to the Malay Archipelago and beyond.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Batrachocephalus mino*, A. 20. Silvery, darkest along the back and upper lobe of the caudal fin. Seas, estuaries and tidal rivers of India to the Malay Archipelago.

1. **Batrachocephalus mino,** Plate CVIII, fig. 1.

Ageneiosus mino, Ham. Buch. Fish. Ganges, pp. 158, 375.

Batrachocephalus ageneiosus, Bleeker, Silur. Batav. p. 52.

Batrachocephalus micropogon, Bleeker, l. c. p. 118, and Atl. Ich. Silur. p. 48, t. 65, f. 1.

Batrachocephalus mino, Bleeker, Beng. en Hind. p. 58; Günther, Catal. v, p. 182; Day, Fish. Malabar, p. 182.

B. v, D. $\frac{1}{7}$/0, P. 1/7, V. 6, A. 20 ($\frac{5}{15}$), C. 15.

Length of head $4\frac{1}{2}$, of caudal 5, height of body 6 in the total length. *Eyes*—diameter 4 in the length of head, 1/2 a diameter from the end of snout, and $1\frac{1}{2}$ apart. The greatest width of the head equals its length behind the middle of the eyes. Gape of mouth wide, the cleft of the mouth reaches to below the centre of the orbit. Occipital process rather longer than wide at its base, it is lineated in roughened lines. Basal-bone crescentic and narrow. *Barbels*—minute. *Teeth*—in a broad longitudinal band on the palate. *Fins*—dorsal spine of moderate strength, as long as the head behind the middle of the eyes: base of the adipose dorsal equal to half that of the rayed fin. Dorsal and pectoral spines serrated on both edges. Upper caudal lobe a little the longer. *Colours*—silvery, darkest along the back and upper lobe of the caudal fin.

Habitat.—Seas, estuaries and tidal rivers of India and Burma to the Malay Archipelago: the one figured was from the Irrawaddi. It is not common and held in no esteem as food.

Genus, 7—Ketengus, *Bleeker*.

Branchiostegals five. Gill-membranes united, not confluent with the isthmus, but having a free posterior edge, which is notched. Head osseous superiorly. Eyelids with a free circular margin. Cleft of mouth deep: upper jaw the longer. Barbels six, small, no nasal ones. Nostrils approximating, the posterior provided with a valve. A single row of compressed teeth, which are sub-truncated or almost tricuspid in the jaws: palate edentulous. Dorsal fin with one spine and seven rays, inserted anterior to the ventrals: adipose fin short: anal of moderate length and not continuous with the caudal, which latter is forked. Ventral with six rays. Air-vessel not enclosed in bone. An axillary pore.

Geographical distribution.—Andamans to the Malay Archipelago.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Ketengus typus*, A, 19-20. Silvery. Andamans to the Malay Archipelago.

1. **Ketengus typus,** Plate CVIII. fig. 2.

Bleeker, Silur. p. 9, Nat. Tyds. Ned. Ind. i, p. 271, and Atl. Ich. Siluridæ, p. 44, t. 82, f. 1; Günther, Catal. v, p. 177.

Pimelodus pectinidens, Cantor, Catal. p. 261.

B. v, D. $\frac{1}{7}$/0, P. 1/7-8, V. 6, A. 19-20 ($\frac{5-6}{14}$), C. 15.

Length of head $4\frac{3}{4}$, of caudal $5\frac{1}{4}$, height of body $5\frac{1}{4}$ in the total length. *Eyes*—diameter $5\frac{1}{4}$ in the length of head, $1\frac{1}{4}$ diameters from end of snout, and $2\frac{1}{2}$ apart. The greatest width of the head equals its length excluding the snout. Upper surface of the head, occipital process and basal bone of the dorsal fin densely granulated. The width of the gape of the mouth equals the length of the head excluding the snout. Longitudinal groove along the upper surface of the head deep but narrow, commencing on the snout it is not continued so far as to the base of the occipital process which is as long as wide at its base. *Teeth*—as defined in the genus. *Fins*—dorsal spine as long as the head and serrated on both edges: base of the adipose nearly as long as that of the rayed fin. Pectoral spine a little shorter than that of the dorsal and serrated on both edges. *Colours*—silvery.

Habitat.—The Andamans to the Malay Archipelago. The specimen figured was from Port Blair.

Genus, 8—Osteogeniosus, *Bleeker.*

Branchiostegals five. Gill-membranes united at the throat, emarginate and overlapping the isthmus not being confluent with it: upper surface of the head covered with very thin skin: mouth anterior: upper jaw the longer. Nostrils approximating, the posterior provided with a valve. Barbels, a single pair of semi-osseous maxillary ones. Teeth in the jaws villiform: obtusely conical on the palate, where they form two widely separated patches. Dorsal with one spine and seven rays, inserted anterior to the ventrals: adipose fin short. Anal of moderate length not united with the caudal, which is forked. Ventral with six rays. Air-vessel in the abdominal cavity not enclosed in bone. An axillary pore.

Geographical distribution.—Seas and estuaries of India to the Malay Archipelago, sometimes entering rivers.

Uses.—Eaten by the poorer classes. A coarse isinglass is made from its air-vessel.

SYNOPSIS OF SPECIES.

1. *Osteogeniosus militaris*, A. 19-22. Length of head $4\frac{1}{4}$ to $4\frac{1}{2}$ in the total length. Greatest width of head equals its length behind the angle of the mouth. Seas of India to the Malay Archipelago.

2. *Osteogeniosus sthenocephalus*, A. 20. Length of head $4\frac{3}{4}$ in the total length. Greatest width of head equals 1/2 its length. Burma.

1. Osteogeniosus militaris, Plate CVIII, fig. 4.

Silurus militaris, Linn. Syst. Nat. i, p. 503; Bl. Schn. p. 375.
Arius militaris, Cuv. and Val. xv, p. 114, pl. 430; Cantor. Catal. p. 259.
Ageniosus militaris, Swainson, Fishes, ii, p. 305.
Osteogeniosus Cantoris, Bleeker, Beng. en Hind. pp. 130, 582; Blyth. P. A. S. of Beng. 1858, p. 286.
Osteogeniosus militaris, Bleeker, Beng. en Hind. p. 58; Günther, Catal. v, p. 181; Kner. Novara Fische, p. 314; Day, Fish. Malabar, p. 181.
Poné kelíti, Tam.

B. v, D. $\frac{1}{7}$/0, P. 1/10-11, V. 6, A. 19-22 ($\frac{4-5}{15-17}$), C. 17, Vert. 18-29.

Length of head $4\frac{1}{4}$ to $4\frac{1}{2}$, of caudal $7\frac{1}{2}$, height of body $5\frac{1}{4}$ to $6\frac{1}{2}$ in the total length. *Eyes*—diameter 7 in the length of head, 2 diameters from the end of snout and 4 apart. The greatest width of the head equals its length behind the angle of the mouth: its height 2/3 of its length: the width of the gape of the mouth equals half the length of the head. Occipital process $2\frac{1}{2}$ times as long as wide at its base, and its length equals 1/3 of that of the head. Median longitudinal groove of moderate width not extending so far as the base of the occipital process. Upper surface of the head almost or quite smooth, a few granulations generally present between the posterior end of the median longitudinal groove and the base of the occipital process, which last is roughened in ridges which are sometimes granular: there also usually exists a patch of granulations above the upper edge of the opercle on the head. *Barbels*—rather longer than the head. *Teeth*—on the palate in two somewhat crescentic patches converging anteriorly. *Fins*—dorsal spine as long as the head excluding the snout, serrated in its upper portion anteriorly and in its whole extent posteriorly. Pectoral spine somewhat stronger than that of the dorsal, the fin reaches about half way to the ventral. Anal highest anteriorly where it equals half the length of the head. *Colours*—silvery, darkish superiorly, fins tinged with red.

Habitat.—Seas, estuaries and tidal rivers of India to the Malay Archipelago. A specimen in the Calcutta Museum is 14 inches long. The specimen figured was from Bombay and is 8 inches in length.

2. Osteogeniosus sthenocephalus, Plate CVIII, fig. 3.

B. v, D. $\frac{1}{7}$/0, P. 1/9, V. 6, A. 20 ($\frac{5}{15}$), C. 17.

Length of head $4\frac{3}{4}$, of caudal $5\frac{1}{2}$, height of body $7\frac{1}{2}$ in the total length. *Eyes*—diameter $6\frac{1}{2}$ in the length of head, 2 diameters from the end of snout, and 3 apart. The greatest width of the head equals half its length: the width of the gape of the mouth equals half the length of the head. Occipital process three times as long as wide at its base, its length equals 1/3 of that of the head. Median longitudinal groove rather wide and does not extend quite to the base of the occipital process. Upper surface of the head with a few granulations between the posterior end of the median grove and the base of the occipital process, which last is roughened in ridges. *Barbels*—as long as the head. *Fins*—as in the last species, except that the anterior portion of the anal fin is as deep as the head excluding the snout is long. *Colours*—silvery, darkest superiorly.

This fish differs from the preceding species in having a much narrower head, deeper anal fin, and flatter snout.

Habitat.—A single specimen captured at Moulmein.

Genus, 9—Pangasius, *Cuvier and Valenciennes.*

Pseudopangasius and *Helicophagas*, Bleeker.

Branchiostegals from about seven to twelve. Gill-openings wide, the membranes not confluent with the skin of the isthmus and rather deeply notched. Upper jaw the longer. Eye with a free orbital margin. Nostrils at some

distance apart, both patent, the anterior situated in front of, or on the upper edge of the snout. Four slender barbels, one maxillary and a pair behind the chin. Teeth villiform intermixed with conical ones in the jaws: those in the vomer, if present, distinct from those on the palatines. Dorsal fin inserted anterior to ventral and with one spine and seven rays: adipose fin short. Ventral with six rays. Pectoral with a spine. Anal rather elongate (29 to 39 rays), not confluent with the caudal. Air-vessel in the abdominal cavity and not enclosed in bone. One or more axillary pores.

This genus is divided by Bleeker in the following manner:—

A.—*Anterior nostril patent and entirely anterior on the snout.*

1. *Pangasius.* Four groups of teeth on the palate, those on the palatines close to the vomerine ones and forming a transverse band.

2. *Pseudopangasius.* Vomerine teeth forming a broad square patch, those on the palate in an oblong lateral patch.

B.—*Anterior nostril patent on upper edge of the snout.*

3. *Helicophagus.* Teeth on the vomer if present in two small patches.

Geographical distribution.—Large rivers and estuaries of India and Burma to the Malay Archipelago.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Pangasius Buchanani*, D. $\frac{1}{7}$/0, A. 31-34. Large rivers of India and perhaps Java.

1. Pangasius Buchanani, Plate CVIII, fig. 5.

Pimelodus pangasius, Ham. Buch. Fish Ganges, pp. 163, 378, pl. 38, f. 52.

Pangasius Buchanani, Cuv. and Val. xv, p. 45, pl. 425; Bleeker, Hind. pp. 58 and 118; Blyth, Proc. A. S. of Beng. 1858, p. 286; Günther, Catal. v, p. 62.

? *Pangasius djambal*, Bleeker, Batav. p. 181, and Atl. Ich. Silur. p. 73, t. 76; Günther, Catal. v, p. 62.

Jellum, Ooriah.

B. ix-x, D $\frac{1}{7}$/0, P. 1/12, V. 6, A. 31-34 ($\frac{4-5}{27-29}$), C. 19.

Length of head $5\frac{1}{2}$ to 6, of caudal 5 to $5\frac{1}{4}$, height of body 4 to 5 in the total length. *Eyes*—partly on the lower surface of the head, and in the commencement of its anterior half, the width of the interorbital space equalling the length of the head excluding the snout. The greatest width of the head equals its length behind the angle of the mouth. Upper jaw the longer: width of the gape of the mouth equals 3/7 of the length of the head, its cleft reaches to below the hind nostril and is opposite the centre of the front edge of the eye. Upper surface of the head smooth in small specimens, rather lineated in large ones especially along the occipital process which is from $2\frac{1}{2}$ to 3 times as long as wide at its base. *Barbels*—the maxillary ones reach the base of the pectoral fin: the mandibular ones are half as long as the head. *Teeth*—on the palate in a crescentic row, the vomerine patches being either distinct from or just confluent with those on the palate. *Fins*—dorsal spine of moderate strength, as long as the head behind the angle of the mouth, slightly serrated anteriorly, in its entire length pesteriorly. Pectoral spine rather stronger than that of the dorsal, in some specimens of the same length, in others as long as the head, denticulated internally. Caudal deeply forked. *Colours*—silvery, darkest along the back and glossed with purple on the sides: cheeks and under surface of the head shot with gold. *Air-vessel*—large, its anterior portion occupies about 1/2 the length of the abdominal cavity, and is then divided by a constriction from the second portion, which is narrowed and divides into two small continuations one of which extends on either side amongst the muscles covering the hæmal spines, as far as to above the middle of the anal fin. The anterior portion of the air-vessel has a large pyramidal and cellular cavity, the base of which is anterior, on either side of this cellular cavity is a pyriform smooth chamber the two communicating anteriorly. The remainder of the air-vessel is cellular or rather furnished with valvular-formed folds.

Habitat.—Large rivers and estuaries of India, Assam, Burma, and perhaps the Malay Archipelago. It attains upwards of 4 feet in length, and is a foul feeder.

Genus, 10—PSEUDEUTROPIUS,* *Bleeker.*

Clupisoma, Swainson; *Schilbeichthys*, Bleeker.

Branchiostegals from six to ten. Gill-openings wide, the membranes not confluent with the skin of the isthmus and rather deeply notched. Body elongated and compressed. Head covered with soft skin. Eyes large, with or without broad adipose lids, and situated behind as well as a little below the angle of the mouth, being usually partly

* Genus *Eutropius*, Muller and Troschel, is closely allied but has its mandibular barbels of each side placed one behind the other: Dr. Gunther gives as its geographical distribution "Tropical Africa, East Indies." Two of the species he cites belong to *Pseudeutropius*, the remaining one he describes as new. *Eutropius obtusirostris*, Gunther Catal. v, p. 53, it seems to be of doubtful East Indian origin: it was purchased in Liverpool, and is as follows:—

D. $\frac{1}{5}$ | 0, P. 1/8, V. 6, A. 54.

Height of body $4\frac{1}{3}$ in the total length without the caudal fin: length of head $4\frac{2}{3}$. Eyes without adipose lids. Maxillary barbels as long as the head. Dorsal spine 3/4 as long as the head. Vomerine teeth in an uninterrupted transverse band, not confluent with the palatine one. India 3 inches long. This fish appears to me to be probably of African origin.

on the inferior surface of the head. Upper jaw, as a rule, the longer. Nostrils patent, the posterior ones transverse and as near together as they are to the anterior pair. Barbels eight, one nasal pair, one maxillary and two mandibular pairs, these last commencing in a transverse line close to the hind margin of the lower lip. Teeth villiform on the jaws and palate. Dorsal fin short, with one spine and six to eight rays; a very small adipose dorsal which may be absorbed in the adult (Schilbeichthys): pectoral with a serrated spine: anal long, terminating at some distance from a forked caudal. Ventral with from 6 to 8 rays. Air-vessel rather small, somewhat heart-shaped, with a notch at its anterior edge, and closely attached to the front surfaces of the vertebræ. An axillary pore generally present.

Geographical distribution.—Fresh waters of Sind, India, Ceylon, and Burma to the Malay Archipelago, where Bleeker observed it appears to have a single representative.*

Uses—These fishes are all excellent as food, but in some localities are to be avoided as they consume offal.

SYNOPSIS OF SPECIES.

Pseudeutropius goongwaree, A. 54. Nasal barbels reach the dorsal, maxillary barbels the anal fin: the mandibular are about as long as the head. Cleft of mouth to below first third of the eye. Deccan, Bengal, and Burma.

2. *Pseudeutropius taakree*, A. 43-46. Maxillary barbels reach middle of pectoral fin, the mandibular ones shorter than the head. Deccan, Kistna, and Jumna rivers.

3. *Pseudeutropius acutirostris*, A. 42-46. Snout projecting, and inferiorly covered with teeth which are entirely in advance of those of the lower jaw. The maxillary barbels reach the anal fin, the mandibular ones are as long as the head. Burma.

4. *Pseudeutropius murius*, A. 38-43. Maxillary barbels as long as head, the others shorter. Rivers of India except its more southern portion.

5. *Pseudeutropius Sykesii*, A. 35-37. Maxillary barbels reach the ventral fin, the mandibular ones as long as the head. Teeth on the palate in two distinct patches.

6. *Pseudeutropius atherinoides*, A. 33-41. Maxillary barbels reach the anal fin, the mandibular are longer than the head. Dark bands along the body, and a spot at the base of the caudal. India (except the western coast) and Assam.

7. *Pseudeutropius garua*, A. 29-36. Maxillary barbels reach the ventral fin, the mandibular pairs are about as long as the head. The adipose dorsal fin is absent in adults. Throughout the large rivers of Sind, India, Assam, and Burma.

1. Pseudeutropius goongwaree, Plate CIX, fig. 3.

Hypophthalmus goongwaree, Sykes, Trans. Zool. Soc. ii, p. 369, t. 64, f. 3.
Bagrus goongwaree, Bleeker, Beng. en Hind. p. 56; Jerdon, M. J. L. and Sc. 1849, p. 336.
Eutropius macrophthalmus, Blyth. P. A. S. of Beng. 1860, p. 156.
Pseudeutropius goongwaree, Günther, Catal. v, p. 61; Day, Proc. Zool. Soc. 1869, p. 617.

B. vi, D. $\frac{1}{7}$ | 10, P. 1/13, V. 6, A. 54 ($\frac{3}{51}$), C. 17.

Length of head 5, of caudal 5, height of body 5 in the total length. *Eyes*—with a very broad circular adipose lid, situated partially on the lower surface of the head, diameter $2\frac{3}{4}$ in the length of head, 3/4 to 1 diameter from the end of snout, and 1 apart. The median longitudinal groove on the head reaches the base of the occipital process, which latter is narrow, especially at its base. Width of the head rather above 1/2 its length. Upper jaw the longer: width of gape of mouth equals the diameter of the eye: cleft extends to below first third of the eye. *Barbels*—the nasal pair reach the base of the dorsal fin, the maxillary the anal fin, and the mandibular ones are about as long as the head. *Teeth*—in a wide pyriform band wider than those in the jaws, the vomerine and palatine groups touching, but the two vomerine patches having a short interspace between them. *Fins*—dorsal spine somewhat slender, nearly as long as the head and very finely serrated posteriorly. Pectoral spine slightly longer, stronger, and rather strongly denticulated internally. Ventral fin not quite 1/2 as long as the head, and under the centre of the dorsal fin. Caudal forked. Free portion of the tail rather higher at its base than it is long. *Colours*—silvery, darkest superiorly.

Habitat.—Rivers of the Deccan, Bengal and Burma, attaining about a foot in length. The specimen figured (life-size) was from Kurnool.

2. Pseudeutropius taakree, Plate CIX, fig 4.

Hypophthalmus taakree,† Sykes, T. Z. S. ii, p. 369, t. 64, f. 4.
Bagrus taakree, Bleeker, Hind. p. 56; Jerdon, M. J. L. and Sc. 1849, p. 336.
Pseudeutropius longimanus, Günther, Catal. v, p. 60.
Eutropius taakree, Day, P. Z. S. 1867, p. 564.
Pseudeutropius taakree, Day, l. c. 1869, p. 617.

* Dr. Günther (Geolog. Mag. Oct. 1876) determines a fossil fish from Sumatra, *deficient of a head*, to be a *Pseudeutropius*. He does not note the position of the barbels!

† For remarks on the specimen of *Pseudeutropius*, Sykes, which formed the type of *P. longimanus*, Günther, see Preface under the head of Col. Sykes.

B. vi, D. $\frac{1}{6}\frac{}{7}$ | 0, P. I/10-11, V. 6, A. 43-52 $(\frac{3}{40}\text{-}\frac{4}{50})$, C. 17.

Length of head 6 to $6\frac{1}{3}$, of caudal 6, height of body 5 to 6 in the total length. *Eyes*—situated behind the angle of the mouth and partly on the under surface of the head, having broad circular adipose lids, diameter $2\frac{3}{4}$ to 3 in the length of head, 2/3 to 1 diameter from end of snout, and 1 apart. The greatest width of the head equals 1/2 its length, the width of the gape of the mouth 2/5: the cleft of the mouth extends to opposite the middle of the front edge of the eye. Occipital process long and slender, scarcely reaching the basal bone of the dorsal fin. Median longitudinal groove on the head shallow and reaching to the occipital process. *Barbels*—the nasal half as long as the head, the maxillaries reach the anal, whilst the mandibular ones are a little longer than the head. *Teeth*—the vomerine and palatine ones in a distinct patch. *Fins*—dorsal spine smooth anteriorly, serrated posteriorly, it is as long as the head without the snout. Pectoral spine stronger, serrated internally and almost as long as the head. Ventral rather above half as long as the head and reaches the anal. Free portion of the tail about as high at its base as it is long. *Colours*—silvery, with a gloss of green along the back: caudal stained with gray at its edges.

I have obtained in Burmah, as high as Mandalay, specimens which I am unable to separate from this species, except that in some the pectoral spine is slightly shorter, in others the adipose fin is almost or quite absent.

Habitat.—Poona, the Deccan, the rivers Kistna and Jumna. It attains upwards of a foot and a half in length, and is good eating. The specimen figured (life-size) was from Kurnool.

3. Pseudeutropius acutirostris, Plate CIX, fig. I.

Day, Proc. Zool. Soc. 1869, p. 618.

? Bagrus exodon, Val. in Bel. Voyage Ind. Or. Zool. p. 385, pl. 4, f. 1; Cuv. and Val. xiv, p. 394; Bleeker, Beng. p. 56.

B. vi, D. $\frac{1}{6}$ | 0, P. I/7, V. 6, A. 42-46 $(\frac{2}{40\text{-}44})$, C. 17.

Length of head $4\frac{2}{3}$ to 5, of caudal 5, height of body 5 in the total length. *Eyes*—without adipose lids, situated behind the cleft of the mouth, diameter 1/3 of the length of the head, 1 diameter from the end of snout, and also apart. The greatest width of the head equals half its length. Upper surface of the head flat and rugose. Upper jaw elongated, and projecting considerably beyond the lower. The median longitudinal groove on the head reaches the base of the occipital process, which is narrow and 2/7 as wide at its base as it is long. *Barbels*—the nasal rather longer than the head, the maxillary reach the base of the anal fin, the mandibular ones as long as the head. *Teeth*—the whole of the under surface of the snout toothed, the premaxillaries being entirely in advance of the lower jaw,* in two minute patches on the vomer, and of the same character on the palatines, which are not continuous with those on the vomer. *Fins*—dorsal spine as long as the head behind the angle of the mouth, it is finely serrated posteriorly. Pectoral spine strong, rough externally, and with about ten strong teeth internally, it is as long as the head excluding the snout. Ventral arises somewhat behind the base of the dorsal fin: caudal deeply forked. *Colours*—silvery, a black spot on the occiput, and a black blotch at the base of the dorsal fin.

The snout of this species much resembles that of *Arius acutirostris*, plate XCVII. The description in Cuv. and Val. of *Bagrus exodon* appears to apply to this species, but the figure is very different, whereas it is said to have come from Bengal.

The common form has no elongation of the snout, although of the same size as the one having such an elongation, but otherwise the same. The eyes as a consequence are $2\frac{1}{2}$ in the length of head, and 1/2 a diameter from the end of snout: one specimen has a long anal papilla. It extends all through the rivers of Burma as far to the east as Moulmein. It is evidently the Burmese representative of *P. atherinoides* of India. Belangers specimen if from India (not Burma) may have been a specimen of the *P. atherinoides* with an elongated snout.

Habitat.—The Irrawaddi and other large Burmese rivers. It does not appear to exceed the size of the specimen figured.

4. Pseudeutropius murius, Plate CIX, fig. 6.

Pimelodus murius, Ham. Buch. Fish. Ganges, pp. 195, 378.
Bagrus murius, Cuv. and Val. xiv, p. 393; Bleeker, Beng. p. 56.
Pachypterus melanurus, Swainson, Fishes, ii, p. 306.
Bagrus Buchananii, Val. in Jacq. Voy. Ind. Orient. pl. xvi, f. 3.
Eutropius ? murius, Günther, Catal. v, p. 54.
? Pseudeutropius megalops, Günther, Catal. v, p. 60.
Pseudeutropius murius, Day, Proc. Zool. Soc. 1869, p. 306.
Muri-vacha, Ooriah and Bengali; *Motusi*, Beng.; *Butchua*, Hind.; *Ke-raad*, Punj.; *Chhotká váchoyá*, of the Kusi (H. B.)

B. v, D. $\frac{1}{7}$ | 0, P. I/10, V. 6, A. 38-43 $(\frac{3}{35\text{-}40})$, C. 17.

* In the variety in which the snout is not elongated, still the premaxillary is entirely in front of the mandibles.

Length of head $5\frac{1}{2}$ to 6, of caudal $5\frac{1}{2}$ to 6, height of body $5\frac{1}{2}$ to 6 in the total length. *Eyes*—lateral and very slightly on the lower surface of the head: each with a broad, circular, adipose lid, diameter 3 to $3\frac{3}{4}$ in the length of head, 3/4 of a diameter from end of snout, and 1 apart. The greatest width of the head is rather above 2/3 of its length. Jaws compressed, the upper slightly the longer, the cleft reaches nearly or quite to below the front edge of the eye: the width of the gape equals 1/3 of the length of the head. The median longitudinal groove on the head extends to the end of the occipital process which is narrow, short, half as wide at its base as it is long, and with a long interspace between it and the basal bone of the dorsal fin. *Barbels*—the nasal reach to a short distance behind the posterior edge of the orbit: the maxillary to the base of the pectoral fin, whilst the two mandibular pairs are a little longer than the head. *Teeth*—on the vomer and palate form an almost uninterrupted semilunar band. *Fins*—dorsal spine nearly as long as the first ray, it is weak, as long as the head excluding the snout, very finely serrated anteriorly, more coarsely posteriorly. Pectoral spine weak, nearly or quite as long as the head, rough externally, serrated internally. Ventral small, 1/3 as long as the head. Caudal deeply forked. Caudal peduncle as long as deep at its base. *Colours*—silvery, lightest along the sides and below: dorsal, pectoral and caudal fins darkest at their margins.

In *P. megalops*, the maxillary barbels extend to beyond the origin of the anal fin, but I do not see any other difference.

Bagrus Buchanani, Val. in Jacq. Voy. Ind. Orient. belongs to this Genus, as I convinced myself on seeing the type specimen, but my notes on which I have mislaid. I think it was this species but am in doubt.

Habitat.—Rivers of Sind, Orissa, the Jumna and rivers of Bengal and Assam, attaining about 6 or 8 inches in length. The figure of this fish is on Plate cviii, fig. 6, not Plate cix, as stated on the last page.

5. Pseudeutropius Sykesii, Plate CIX, fig. 5.

Schilbe Sykesii, Jerdon, M. J. L. and Sc. 1849, p. 335.
Pseudeutropius Mitchelli,* Günther, Catal. v, p. 59.
Pseudeutropius Sykesii, Day, Proc. Z. S. 1865, p. 289, and Fishes of Malabar, p. 191.
Nah-kelletee, Tam.

B. viii-ix, D. $\frac{1}{7}$ | 0, P. 1/9, V. 6, A. 35-37 ($\frac{3}{32-34}$), C. 17.

Length of head 6, of caudal 6, height of body 6 in the total length. *Eyes*—diameter 3 to $3\frac{1}{4}$ in the length of head, 1 diameter from the end of snout, and $1\frac{1}{4}$ apart. Head rather higher than wide, its greatest width equals its length excluding the snout. The angle of the mouth is on a level with the lower edge of the orbit. Upper jaw slightly the longer: posteriorly it reaches 2/3 of the distance between the snout and front edge of the orbit. The median longitudinal groove on the upper surface of the head reaches to the base of the occipital process, which latter is narrow. *Barbels*—the nasal pair reach to the front edge of the orbit, the maxillary pair to the end of the pectoral or middle of the ventral, the mandibular ones are as long as, or a little longer than the head. *Teeth*—those on the palate in two distinct patches. *Fins*—dorsal spine slender, as long as the head excluding the snout, and finely serrated posteriorly: adipose fin small. Pectoral spine stronger and slightly longer than that of the dorsal, smooth externally, denticulated internally with about twenty-two teeth. Ventral commences just behind the vertical from the last dorsal ray: caudal forked, lower lobe slightly the longer. *Colours*—bluish-silvery along the back, becoming silvery-white on the sides and below. Dorsal and caudal gray, the other fins white.

Habitat.—Western coast of India in fresh-water, it attains about 6 inches in length.

6. Pseudeutropius atherinoides, Plate CIX, fig. 2.

Silurus atherinoides, Bloch, t. 371, f. 1; Bl. Schn. p. 386.
Pimelodus anguis and *urua*, Ham. Buch. Fish. Ganges, pp. 177, 180, 377, pl. 29, f. 59.
Bagrus atherinoides, Cuv. and Val. xiv, p. 396; Bleeker, Beng. p. 56; Jerdon, M. J. L. and Sc. 1849, p. 336.
Bagrus anguis and *urua*, Cuv. and Val. xiv, pp. 393, 395; Bleeker, Beng. pp. 54, 56; Blyth, Proc. Asi. Soc. Beng. 1858, p. 285.
Pachypterus atherinoides and *trifasciatus*, Swainson, Fishes, ii, p. 306.
Bagrus exodon, Bleeker, Hind. p. 111 (not Val.)
Pseudeutropius atherinoides, Günther, Catal. v, p. 58.
Put-tul, and *Chel-lee*, Punj.; *Ah-hee*, Sind.; *Put-tah-re*, N. W. Prov.; *Akku-jella*, Tel.; *Battuli* and *Bo-potassi*, Ooriah; *Boh-du-ah*, (*Pátúsí*, and *Doyá*, H. B.), Assam.

B. vi, D. $\frac{1}{5-6}$ | 0, P. 1/7, V. 6, A. A. 33-41 ($\frac{3}{30-38}$), C. 17.

Length of head 5 to $5\frac{1}{2}$, of caudal 5, height of body $4\frac{1}{3}$ to $5\frac{1}{2}$ in the total length. *Eyes*—with free orbital margins, no adipose lids, situated partially on the lower surface of the head: diameter $2\frac{1}{2}$ to 3 in the

* Dr. Günther as a Recorder of facts, animadverted on my considering *his well-determined! P. Mitchelli*, a synonym of *P. Sykesii*, Jerdon, observing "if he cannot verify his assertion by the examination of the typical specimen, he has no right to exchange the name of a well-determined species for a doubtful one," (Zool. Record. 1865, p. 199). Jerdon had described the species fifteen years before Dr. Günther, and sufficiently well for my recognizing it at a locality where he found it.

length of head, and about 1/2 a diameter from the end of snout. The greatest width of the head equals two-thirds of its length. Upper jaw a little the longer. The median longitudinal groove on the head broad, shallow, and reaches to the base of the occipital process, which is four times as long as broad at its base and extends to the basal bone of the dorsal fin. *Barbels*—the nasal slightly longer than the head, the maxillary reach the base of the anal (in some Madras specimens only to the ventral) fin, the mandibular pair are rather longer than the head. *Teeth*—in the premaxillaries usually anterior to those in the mandibles: in a narrow, uninterrupted, crescentic band across the palate. *Fins*—dorsal spine two-thirds as long as the head, anteriorly rugose, finely serrated posteriorly. Pectoral spine rather longer and stronger than that of the dorsal, with about ten denticulations internally. Ventral half as long as the head. Caudal deeply forked. *Colours*—silvery, greenish along the back, and with three or four bands along the sides formed by black spots. Occiput and anterior portion of dorsal fin dark coloured.

In a specimen from the Deccan a rather elongated anal papilla exists. I have found the number of anal rays in different localities as follows: Sind, 38-39; Punjab, 35-39; Assam (lower) 38, (upper) 41-44; the Sone river, 38-44; Orissa, 38-41; Madras, 35-36. Some of the higher numbers, as at Debrooghur in Upper Assam and a single specimen with 44 anal rays at the Sone river, I have omitted from the above formula.

Habitat.—Throughout Sind, India (excluding the western coast) and Assam; rarely attaining to above 4 or 5 inches in length. *P. urua* is said to come from rivers and ponds of the northern parts of Bengal.

8. **Pseudeutropius garua,** Plate CIX, fig. 6.

Silurus garua, Ham. Buch. Fish. Ganges, pp. 156, 375, pl. 21, f. 50.

Schilbe garua, Cuv. and Val. xiv, p. 379, pl. 413; Bleeker, Beng. pp. 54, 110; Blyth, Proc. A. S. of Beng. 1858, p. 283.

Clupisoma argentata, Swainson, Fishes, ii, p. 306.

Schilbichthys garua, Günther, Catal. v, p. 57.

Psudeutropius garua, Day, Proc. Zool. Soc. 1869, p. 307.

Punia buchua, Ooriah; *Puttosi*, Beng.; *Buchua*, Hind.; *Dhon-ga-nu*, Sind.; (*Kocha*, Testa, H. B.)

B. vi, D. $\frac{1}{7}$, P. 1/11, V. 6, A. 29-36 ($\frac{3}{26-33}$), C. 17.

Length of head $5\frac{1}{2}$ to $6\frac{1}{2}$, of caudal $4\frac{1}{2}$, height of body $5\frac{1}{3}$ to 7 in the total length. *Eyes*—situated partly on the lower surface of the head, having a broad, circular, adipose lid, diameter $3\frac{1}{2}$ to 4 in the length of the head, $1\frac{1}{4}$ diameters from the end of snout, and $2\frac{1}{2}$ apart. The greatest width of the head equals its length excluding the snout. Upper jaw the longer, the width of the gape of the mouth is 2/5 in the length of the head. Occipital process about four times as long as it is wide at its base, and does not quite reach the basal bone. *Barbels*—nasal from 1/3 to 1/2 as long as the head, the maxillary extend to the middle or end of the ventral fin, the two mandibular ones are about as long as the head. *Teeth*—in a semilunar band across the palate, those of the vomer contiguous to those of the palatines, and each patch being semicircular internally: sometimes the two vomerine patches have an interspace between them. *Fins*—dorsal spine rather slender, rugose anteriorly and feebly serrated posteriorly, as long as the head behind the nostrils, whilst the pectoral is of equal length or a little longer, stronger and denticulated internally. The adipose dorsal generally only exists in the immature, and becomes almost imperceptible in the adult: as its non-existence forms the chief distinction of the Genus *Schilbichthys* from that of *Pseudeutropius*, whilst its absence is merely the result of age, I have not adopted the former designation. Lower caudal lobe the longer. *Air-vessel*—small, somewhat heart-shaped, and closely attached to the front surface of the anterior vertebræ. *Colours*—silvery, fins stained with gray.

Habitat.—Found generally throughout the larger rivers of Sind, India, Assam, and Burma. Attains upwards of two feet in length. The specimen figured (7 inches long) was from Calcutta.

Genus, 11—Olyra,* *McClelland.*

Branchiosteus, Gill.

Body elongate and low, the dorsal profile nearly horizontal: head depressed and covered superiorly with soft skin. Gill-openings wide, the gill-membranes not being confluent with the skin of the isthmus, but notched nearly to the chin. Mouth terminal and transverse: jaws of about equal length, or the lower the longer. Nostrils remote from one another, the posterior provided with a barbel. Barbels eight. Eyes small. Villiform teeth in the jaws and on the palate. First dorsal fin without a spine,† and with from six to eight rays: adipose dorsal long and low. Anal of moderate length (15 *to* 23 *rays*) *: ventrals inserted below the dorsal and having six rays: caudal rounded or lanceolate. Air-vessel not enclosed in bone. Skin smooth.*

Gill subdivided the Genus into (*a*) those species which have the jaws subequal in length: anal with more than 20 rays: caudal lanceolate (*Olyra*); (*b.*) others in which the lower jaw projects: anal with less than 20 rays: caudal rounded (*Branchiosteus*).

Geographical distribution.—Small fishes from the Khasya hills and British Burma.

* Preoccupied by Linn. in order *Gramineæ.*

† Dr. Günther observes "dorsal fin short with a spine." McClelland says "no dorsal spine," and I have found none in *O. Burmanica.*

SYNOPSIS OF SPECIES.

1. *Olyra longicaudata*, D. 7/0, A. 23. Jaws of equal length. Caudal lanceolate. Khasya hills.
2. *Olyra Burmanica*, D. 8/0, A. 16. Jaws of equal length. Caudal lanceolate. Pegu hills.
3. *Olyra laticeps*, D. 6/0, A. 15. Lower jaw the longer. Caudal rounded. Khasya hills.

1. Olyra longicauda.

McClelland, Cal. J. N. H. ii, p. 588, pl. xxi, f. 1; Bleeker, Beng. p. 58; Günther, Catal. v, p. 98.

B. vi, D. 7/0, P. $\frac{1}{6}$, V. 6, A. 23, C. 12.

Jaws of equal length. *Barbels*—eight. *Fins*—pectoral, preceded by a rough spine. The middle rays of the caudal prolonged to a lengthened point. *Air-vessel*—membraneous, and placed in the anterior part of the abdomen.

Habitat.—Khaysa hills.

2. Olyra Burmanica, Plate CXI, fig. 5.

D. 8/0, P. $\frac{1}{4}$, V. 7, A. 16 ($\frac{3}{13}$), C. 17.

Length of head $7\frac{1}{2}$, of caudal 3, height of body $7\frac{1}{2}$ in the total length. *Eyes*—small, subcutaneous, and in the anterior half of the head, above the level of the angle of the mouth. Jaws of nearly equal length, head depressed. Nostrils patent, wide apart, the posterior with a barbel in front of it, the anterior just over the snout, but not in front of it. Gill-openings wide, not confluent with the isthmus, and extending laterally to opposite the end of the opercle. *Barbels*—eight, not dilated at their bases, the maxillary are the longest, almost extending to the base of the ventral fin, the external mandibular as long as the head. *Teeth*—villiform in both jaws, the outer row slightly the longest; in an uninterrupted horse-shoe shaped band across the palate. *Lateral-line*—present. Skin smooth. *Air-vessel*—large, thin, and in the abdominal cavity. *Fins*—dorsal without any spine, its first ray the shortest, it arises opposite the ventral: adipose dorsal very low and long. Pectoral spine rather strong, slightly serrated externally, coarsely so internally, the fin only extends half way to the ventral. The anal rays increase in length to the last. Caudal with its central rays strongest and elongated, making the fin one third of the total length. *Colours*—dark brown.

Habitat.—Pegue Yomas or Mountains.

3. Olyra laticeps.

McClelland, C. J. N. H. ii, p. 588, pl. xxi, f. 2; Bleeker, Beng. p. 58.

Branchiosteus laticeps, Gill, Proc. Boston, Nat. Hist. Soc. 1862, p. 52; Günther, Catal. v, p. 98.

B. xiii, D. 6/0, P. $\frac{1}{9}$, V. 7 (6 ?), A. 15, C. 18.

Eyes—small and vertical. Head much depressed at the snout. Lower jaw longer than the upper. Six or eight slender barbels. *Teeth*—villiform in the jaws, palate edentulous. *Fins*—the anal rays gradually increase in length from the commencement of the fin. Caudal entire.

Habitat.—Khasya hills.

Genus, 12—CALLICHROUS, *Ham. Buch.*

Ompok, Lacép.: *Kryptopterus*,* *Kryptopterichthys*, *Micronema*, *Phalacronotus*, *Hemisilurus*, *Silurodes*, *Pseudosilurus*, and *Silurichthys*, Bleeker: *Pterocryptis*, Peters.

Branchiostegals twelve to fifteen. Gill-openings wide, the membranes not confluent with the skin of the isthmus, are deeply notched and overlap. Head covered with skin. Cleft of mouth oblique, not extending so far as the front edge of the eyes: the lower jaw the longer. Eyes subcutaneous, situated behind and opposite the angle of the mouth, lateral or sometimes partially on the lower surface of the head. Barbels four or two, one maxillary, and some distance behind the symphysis a mandibular pair, the latter sometimes being rudimentary, or even absent. Nostrils remote from one another. Teeth villiform in the jaws, in an uninterrupted (Silurodes, Bleeker*) or interrupted (Callichrous,* Bleeker*) band on the vomer, none on the palatines. Dorsal fin spineless, short, rudimentary, or absent, when present anterior to the ventrals: no adipose fin. Pectoral with a spine. Anal long, continuous with (Pterocryptis,* Peters*) or terminating close to the caudal, the latter being forked, emarginate or rounded. Ventral with eight to ten rays. Air-vessel rather small, attached to the lower surfaces of the second to the fourth vertebræ, and not enclosed in bone. No axillary pore.*

* The Genus *Kryptopterus*, Bleeker (omitting the consideration of the barbels) separates those species wherein the dorsal fin is rudimentary or absent from others in which it is short, being in fact a question of degree. Such being so, I think it preferable not to subdivide them. *Pterocryptis*, Peters, forms perhaps a more natural genus, the anal being united to the caudal, but such a character has not been deemed of sufficient importance to warrant dividing the species of *Goboides* (p. 316), or *Mastacembelus* (p. 339) consequently I have not adopted it here. It is curious that if genus *Krytopterus* were accepted, Professor Peters' Gangetic species with its rudimentary dorsal fin would pertain to such, whereas my Indus one having that fin more developed would belong to *Callichrous*. The only example of a *Cryptopterus* recorded from India, is Professor Peters' fish, this is interesting as it seems a form usually found more to the eastwards.

Geographical distribution.—Sind, India, Ceylon, Burma, through Siam, to the Malay Archipelago and China.

Uses.—Although rarely exceeding a foot in length, these fishes are excellent as food, and owing to their quality have been termed "Butter-fish" by Europeans in Bengal, and are generally known as "*Puffta*," Hind.

SYNOPSIS OF SPECIES.

A. *Anal fin united to the caudal.*

Teeth on the palate in an uninterrupted band.

1. *Callichrous Gangeticus*, D. 2, A. 75. Maxillary barbels not quite so long as the head. Ganges.

Vomerine teeth in two separate patches.

2. *Callichrous Sindensis*, D. 4, A. 45. Maxillary barbels reach middle of pectoral fin. Indus in Sind.

B. *Anal fin distinct from the caudal.*

3. *Callichrous bimaculatus*, A. 60-75, V. 8. Maxillary barbels reach ventral fin. Pectoral not so long as head, spine smooth or serrated. Fresh waters of Sind, India, Ceylon, and Burma to the Malay Archipelago and China.

4. *Callichrous pabo*, A. 66-71, V. 9-10. Maxillary barbels shorter than the head. Pectoral spine feebly serrated. Jumna, Ganges, and Burmese rivers.

5. *Callichrous macrophthalmus*, A. 69-73, V. 8. Eyes large. Maxillary barbels reach middle of fish. Pectoral fin reaches fourth or fifth anal ray. Madras, Assam, and Burma.

6. *Callichrous Malabaricus*, A. 61-69, V. 8. Maxillary barbels reach anal fin: of a purplish brown colour. Malabar coast of India.

7. *Callichrous pabda*, A. 54-60, V. 8. Maxillary barbels reach middle or end of pectoral fin. Sind, Punjaub, Gangetic provinces, sub-Himalayan range, Assam and Orissa.

A. *Anal fin united to the caudal.*

Vomerine teeth in an uninterrupted band.

1. Callichrous Gangeticus.

Pterocryptis Gangetica, Peters, Mon. Berl. Acad. 1861, p. 712.

Cryptopterus Gangetica, Günther, Catal. v, p. 44.

B. xii, D. 2, P. 1/12, V. 10, A. 75.

Length of head nearly 1/7, height of body 2/19 of the total length. Maxillary barbels do not quite reach the pectorals, whilst the mandibular ones reach the edge of the gill-membrane. *Fins*—pectoral spine feebly serrated: anal united with the caudal.

Habitat.—Ganges. I have not procured this species in India, my nearest approach to it being *C. Sindensis.*

2. *Vomerine teeth in two separate patches.*

2. Callichrous Sindensis, Plate CX, fig. 1.

B. xii, D. 4, P. 1/12, V. 8, A. 47 ($\frac{2}{45}$), C. 13.

Length of head $4\frac{2}{3}$, of caudal 7, height of body $4\frac{2}{3}$ in the total length. *Eyes*—diameter $4\frac{1}{2}$ in length of head, 1 diameter from end of snout, and 2 apart. The dorsal profile rather elevated, and a little concave over the orbits. The greatest width of the head equals its height, or its length excluding the snout. Cleft of mouth very oblique, the lower jaw prominent, and the eye situated rather above the angle of the mouth. *Barbels*—the maxillary ones reach to the middle of the pectoral fin: the mandibular ones are thin and nearly half as long as the head. *Teeth*—in two small oval patches on the vomer not confluent in the median line. *Fins*—dorsal narrow at its base. Pectoral spine as long in the head behind the middle of the eyes and finely serrated internally, the fin reaches to nearly above the commencement of the anal. Ventral reaches the first anal ray. Anal united to the caudal. *Colours*—silvery, with a black spot behind the gill-opening and above the base of the pectoral fin, body and fins with numerous cloudy dark markings.

Habitat. Sind from the Indus. The single specimen is figured life size.

3. Callichrous bimaculatus, Plate CX, figs. 4 and 5.

Silurus bimaculatus, Bloch, t. 364; Bl. Schn. p. 377; McClell. Cal. J. N. H. iv, p. 401; Jerdon, M. J. L. and Sc. 1849, p. 334.

Ompok siluroides, Lacép. v, p. 50, vi, t. i, f. 2.

Silurus chechra, *canio*, and *duda*, Ham. Buch. Fish. Ganges, pp. 151, 152, 375.

Silurus microcephalus and *bimaculatus*, Cuv. and Val. xiv, pp. 360, 365.

Silurus Mysoricus, Cuv. and Val. xiv, p. 364; McClelland, Cal. J. N. Hist. iv, p. 402.

Callichrus immaculatus, *nebulosus*, and *affinis*, Swainson, Fishes, ii, p. 306.

Silurus Indicus, McClelland, Cal. Journ. Nat. Hist. ii, p. 583.

Schilbe pabo, Sykes, Trans. Zool. Soc. ii, p. 367 (not *Silurus pabo*, H. B.)

Wallago microcephalus, Bleeker, Beng. en Hind. p. 110.
Pseudosilurus bimaculatus, Bleeker, Prod. Silur. p. 277.
Phalacronotus siluroides, Bleeker, Prod. Silur. p. 304.
Callichrous bimaculatus, Bleeker, Atl. Ich. Silur. p. 84, t. 87, f. 31.
Callichrous bimaculatus, *Ceylonensis*, *chechra* and *canio*, Günther, Catal. v, pp. 45, 46, 48.
Dúka-dúmú, Tel.; *Godla*, Canarese; *Dimmon*, Sind.; *Chotah-wahlah*, Tam.; *Pob-tah*, Ooriah; *Pah-boh*, Assam.; *Pufta*, *Goongwah*, and *Pallu*, Punj.; *Goong-wah-ree* and *Puf-ta*, N. W. Provinces.

B. xii, D. 4, P. 1/13, V. 8, A. 60-75 ($\frac{2-3}{58-72}$), C. 17.

Length of head 5 to 7, of caudal $6\frac{2}{3}$ to 7, height of body $5\frac{1}{3}$ to $5\frac{1}{2}$ in the total length. *Eyes*—situated opposite the angle of the mouth, diameter 4 to $5\frac{3}{4}$ in the length of the head, 1 to $1\frac{2}{3}$ diameters from the end of snout, and $2\frac{3}{4}$ to $3\frac{2}{3}$ apart. The greatest width of the head equals its length behind the angle of the mouth. The lower jaw very prominent, the width of the gape of the mouth equals the postorbital length of the head or behind the middle of the eyes. *Barbels*—the maxillary pair reach the middle of the pectoral or the commencement of the anal. *Teeth*—in two small oval patches, one on either side of the vomer, and not continuous. *Fins*—dorsal arises in the commencement of the second two-seventh's of the body, it is narrow and two-thirds as high as the body. Pectoral as long as the head behind the angle of the mouth, its spine of moderate strength, as long as the head behind the middle of the eyes or as the postorbital length of the head, and strongly or feebly serrated internally, or even entire. Anal ceases close to, but is not continuous with, the forked caudal. *Colours*—silvery shot with purple, a black spot on the shoulder behind the gill-opening and above the middle of the pectoral fin. In some specimens this black spot is much better defined than in others. Occasionally the caudal fin is tipped with black.

Hamilton Buchanan observes that *Callichrous duda* only differs from *C. canio* in having A. 73, instead of A. 69, in his original report he considered them as one. In those reports *C. canio* is said to be identical with the "*Kánipábda* of *Goálpárá*." The figure of *Kanipabda* 4 inches in length, and of which Buchanan has left two views, shows the pectoral spine serrated. Now *C. canio* with a serrated pectoral spine would be the same as *C. chechra*. This brings us to uniting *C. duda* with *C. canio*, and also with *C. chechra*. In speaking of the *Bulaya* of Gorakpur or the *C. canio*, he again observes that this fish is the "Chhotkí chekra" of Purniah.

McClelland (Cal. Journ. Nat. Hist. ii, p. 583) under the head of *Silurus Indicus*, McClell. from Loodianah, remarks that "it is identical with *S. canio*, *S. duda*, and *S. chechra*, Buch. which would seem to be but varieties of a widely diffused and common species."* Subsequently (Cal. Journ. Nat. Hist. iv, p. 403) McClelland remarked "the *chechra* may however be conceived to be a variety of *S. bimaculatus*."

Buchanan remarked (Fish. Ganges, p. 151) that *Callichrous canio* "has a very strong resemblance to *Silurus bimaculatus* of Bloch and of La Cepede, but the tips of its tail fin are not black, a circumstance to which Bloch's fish owes its name. Besides, in Bloch's fish the first ray of each pectoral fin is a very strong indented prickle."

These black marks on fins have little or no signification, especially in a skin, as such may be unnatural, but dark tipped caudal fins are not rare in Madras though uncommon inland. As to the serrated pectoral spine Buchanan himself does not appear whilst in India to have attached a specific value to it, and I now propose to examine whether we are justified in doing so? and whether the *C. chechra* or *C. canio*, H. B. are not identical with *C. bimaculatus*, Bloch?

In Orissa I found the number of anal rays varied from 66 to 74, the length of the head $5\frac{1}{2}$ to $5\frac{2}{3}$ in the total excluding the caudal fin, 50 per cent. had the pectoral spine smooth, 25 per cent. had it finely, whilst in 25 per cent it was coarsely serrated. At the Bowany I took some specimens, probably of *S. Mysoricus*, C. V., 50 per cent. had the pectoral spine denticulated, 25 per cent. had it very finely serrated, and 25 per cent. had it smooth. The length of the head to that of the body averaged $4\frac{3}{4}$ to 5 in Madras: 5 to $5\frac{1}{3}$ in Canara: $5\frac{1}{4}$ to $5\frac{3}{4}$ in the Bowany and also in the Punjab: and $4\frac{2}{3}$ to $5\frac{1}{4}$ in Assam.

The following were the numbers of anal rays. Madras, 60-67; Canara, 67-70; Bowany river, which goes to Mysore, 60-65; Punjab, 68-72; Assam, 73-74. In the Deccan and Sind the numbers ranged from 70-75.

I think it is clear that the character of the pectoral spine, as to whether smooth† or serrated, is no criterion as to species, and that *Callichrous bimaculatus*, Bloch, is identical with *C. chechra*, H. B.

Habitat.—The fresh waters of Sind, and from the Punjab throughout India, Ceylon, and Assam to the Malay Archipelago and beyond. It attains at least a foot-and-a-half in length. Fig. 3 is from a Malabar specimen, $8\frac{1}{2}$ inches long, having its pectoral spine finely serrated internally near its termination. Fig. 4 is from an Assam specimen, 6·2 inches long, and with its pectoral spine finely serrated internally.

4. Callichrous pabo, Plate CX, fig. 6.

Silurus pabo, Ham. Buch. Fish. Ganges, pp. 153, 375, pl. 22, f. 48; Jerdon, M. J. L. and Sc. 1849, p. 335.

* In Vol. IV, Cal. J. N. H. pp. 401, 402, McClelland appears to have altered his opinion, and considered a *Callichrous* from Chusan identical with *C. duda*, H. B., and *C. mysoricus*, C. V.

† At Trichinopoly I opened eight specimens having entire pectoral spines; all were females, one had 47,844 eggs.

Wallago ? pabo, Bleeker, Beng. en Hind. p. 54.
Callichrous pabo, Günther, Catal. v, p. 48.
Callichrous nigrescens, Day, P. Z. S. 1869, p. 616.

B. xii, D. 5, P. 1/14, V. 9-10, A. 66-71 ($\frac{3}{63-68}$), C. 17.

Length of head 5 to $5\frac{1}{4}$, of caudal $8\frac{1}{2}$, height of body 5 to $5\frac{1}{2}$ in the total length. *Eyes*—diameter 4 to $4\frac{1}{2}$ in the length of head, $1\frac{1}{4}$ diameters from the end of snout, and $2\frac{1}{2}$ apart. The greatest width of the head equals its length behind the middle of the eyes. The lower jaw slightly in advance of the upper: the width of the gape of the mouth equals half the length of the head. *Barbels*—the maxillary ones reach the hind edge of the eye or a little further; the mandibular ones fine and short. *Teeth*—in two short transverse patches rather distant from one another in the median line. *Fins*—the dorsal situated in the commencement of the second-third of the length of the body. Pectoral fin as long as the head behind the angle of the mouth, the spine feebly serrated (entire in Burma) and half as long as the head. Ventral with ten rays in India, nine in Burma. *Colours*—silvery, with a badly marked shoulder-spot.

I found in Burma a variety of this fish, *C. nigrescens*, it was clouded all over with fine dark spots, and had black tips to the caudal lobes, and nine ventral rays.

The only specimen I obtained in India was the one figured from the Jumna. There are several in the Calcutta Museum from the Ganges. The species is not common.

Habitat.—Jumna and Ganges rivers, also Burma. Ham. Buchanan observes that it is termed at Patna, *Támbŭlĭyá páptá* or *Callichrous* resembling a betel leaf.

5. Callichrous macrophthalmus, Plate CX, fig. 2 and 3.

Pseudosilurus macrophthalmus, Blyth, Proc. As. Soc. of Beng. 1860, p. 156.
Callichrous notatus, Day, P. Z. S. 1869, p. 616.

B. xv, D. 4, P. 1/12-15, V. 8, A. 69-73 ($\frac{2-3}{66-70}$), C. 18.

Length of head $5\frac{1}{2}$ to 6, of caudal 6 to 7, height of body 5 to 6 in the total length. *Eyes*—diameter $3\frac{3}{4}$ to 4 in the length of head, 1 to $1\frac{1}{2}$ diameters from end of snout, and 2 to $2\frac{1}{4}$ apart. The greatest width of the head equals its length excluding the snout. Cleft of the mouth descends to opposite the upper third of the eye: the width of the gape equals 1/2 to 4/9 of the length of the head. *Barbels*—the maxillary pair reach to opposite the eighth or tenth anal ray: the mandibular ones are nearly 1/2 the length of the head. *Teeth*—in a very narrow oblong patch on either side of the vomer, and not continuous in the median line. *Fins*—the dorsal 1/2 as high as the body, narrow (especially in Madras specimens) and situated in the commencement of the second third of the length of the fish excluding the snout. Ventrals equal $1\frac{1}{2}$ diameters of the eye. Anal not united to the caudal, the latter deeply forked. *Colours*—silvery, a dark round shoulder-spot over the middle of the pectoral spine, this mark is very indistinct in Madras specimens fig. 3, but exceedingly dark in those from Burma.

The only objection to uniting the Madras with the Assam and Burmese form is that the former has P. 1/12-13, the latter P. 1/15. The shoulder spot is not so well marked, and the dorsal fin not so developed in the Madras variety.

This fish is closely allied to *C. bimaculatus*, but has a larger eye, a narrow band of palatine teeth, much longer pectoral fins and maxillary barbels.

The Burmese form *C. notatus* is more elongated.

Habitat.—Madras, Assam, and Burma. Fig. 2 is from an Assam specimen 10·5 inches in length: fig. 3 (life-size) is from a Madras specimen.

6. Callichrous Malabaricus, Plate CXI, fig. 1.

Silurus Malabaricus, Cuv. and Val. xiv, p. 353; Jerdon, M. J. L. and Sc. 1849, p. 334; Günther, Catal. v, p. 34.
Wallago Malabaricus, Bleeker, Beng. en Hind, p. 54; Day, Fishes of Malabar, p. 194.
Mungee Wahlah, Mal.

B. xv, D. 4, P. 1/13-14, V. 8, A. 61-69 ($\frac{3}{58-66}$), C. 17.

Length of head 5 to $5\frac{1}{2}$, of caudal 7, height of body 6 in the total length. *Eyes*—opposite the angle of the mouth, diameter $5\frac{1}{2}$ in the length of head, $1\frac{1}{4}$ diameters from the end of snout, and 3 apart. The greatest width of the head equals its length excluding the snout. Lower jaw strongly prominent. *Barbels*—the maxillary reach to above the commencement of the anal fin, the mandibular ones are short. *Teeth*—in an interrupted band across the vomer. *Fins*—dorsal narrow. Pectoral rounded, as long as the head excluding the snout, its spine strong, nearly 1/2 as long as the head, and rather strongly serrated internally. A notch between the end of the anal and the base of the caudal, the last being deeply forked with the upper lobe the longer. *Colours*—of a deep grayish-brown shot with purple, fin membranes densely spotted with black.

Specimens captured to the South of Canara or in the Cochin district show the most anal rays, a more elongated body, and longer mandibular barbels.

Habitat.—Malabar coast of India up to 20 inches in length. The specimen figured ($16\frac{1}{2}$ inches in length) was from Canara.

7. Callichrous pabda, Plate CXI, figs. 2 and 3.

Silurus pabda, Ham. Buch. Fish. Ganges, pp. 150, 374, t. 25, f. 47; Cuv. and Val. xiv, p. 364.
Silurus anastomus, Cuv. and Val. xiv, p. 363, pl. 410, *(tail injured)*.
Silurus lamghur, Heckel, Fische Kashmir, p. 82, t. xii, f. 5, 6; Bleeker, Beng. p. 54.
Callichrus vittatus, Swainson, Fishes, ii, p. 306.
Wallago pabda and *anastomus*, Bleeker, Beng. p. 54; Blyth, Proc. A. S. of Beng. 1858, p. 283.
Callichrous anastomus and *pabda*, Günther, Catal. v, p. 47.
Silurichthys lamghur, Günther, Catal. v, p. 36.
Cryptopterus latovittatus, Playfair, P. Z. S. 1867, p. 16 *(Mandibular barbels overlooked)*.
Callichrous Egertonii, Day, Proc. Zool. Soc. 1871, p. 710.
Pallu, Punj.; *Pabda*, Beng.

B. xii-xiv, D. 4-5, P. 1/11-13, V. 8, A. 54-60 ($\frac{2}{52-58}$), C. 18.

Length of head 5 to $5\frac{1}{4}$, of caudal 8, height of body 5 to $5\frac{1}{4}$ in the total length. *Eyes*—diameter 5 in the length of head, $1\frac{1}{4}$ to $1\frac{1}{2}$ diameters from end of snout, and $2\frac{1}{2}$ to 3 apart. The greatest width of the head equals its length excluding the snout. The width of the gape of the mouth equals half the length of the head. Lower jaw very prominent. *Barbels*—the maxillary reach the middle or end of the pectoral fin, the mandibular to the hind edge of the orbit. *Teeth*—vomerine ones in two small oval patches, not confluent together. *Fins*—pectoral spine as long as the postorbital portion of the head, or the head behind the middle of the eyes, serrated internally, sometimes rather strongly, at other times feebly, or entirely smooth. Anal not confluent with the caudal. *Colours*—these vary considerably, usually silvery glossed with gold, having a dark shoulder spot above the middle of the pectoral fin, and usually another close to the base of the tail. In some specimens the body is covered with brownish blotches. At Jubbulpore I took specimens having a dark band along the upper portion of the back, and a second along the lateral-line, leaving a light line from the gill-opening to the upper portion of the caudal fin.

My reasons for uniting *C. pabda* (fig. 2), having a smooth pectoral spine, with *C. anastomus* (fig. 3), having a serrated one, are as follows:—the proportions and number of rays are the same. Near Bheer Bhoom in the Sone river I took four specimene of *C. pabda*, three had smooth pectoral spines, the fourth had the pectoral spine on one side feebly serrated. In the Sunderbunds* I found the two sorts together, also in the Brahmaputra, the amount of serrations varying considerably. Towards the Punjab and along the Indus in Sind the serrations become very well developed, and the smooth spined sorts are comparatively rare. It is evident that this condition of the spine is not a sexual one, and no less evident that it is due to some local peculiarity.

Habitat.—Punjab in the affluents of the Indus and along that river to its termination: at Hurdwar where the Ganges emerges from the Himalayas and along its waters in the Gangetic provinces, and Orissa, also from Darjeeling and the Brahmaputra in Assam.

Genus, 13—Wallago, *Bleeker.*

Branchiostegals from fifteen to twenty-one. Gill-openings wide, the membrane not being confluent with the skin of the isthmus, and being rather deeply notched. Body elongated and compressed, the dorsal profile being nearly straight. Head covered with soft skin. Cleft of mouth deep, extending to below or even behind the eyes. Snout rather produced: lower jaw a little the longer. Nostrils some distance apart, the posterior small and patent, the anterior slightly tubular. Barbels four, one maxillary and one mandibular pairs. Eyes above the level of the angle of the mouth, and not covered with skin. Teeth numerous and cardiform in both jaws, and in an oblique patch on either side of the vomer, none on the palatines. A short spineless dorsal, situated above or slightly before the ventrals; no adipose fin: anal long, terminating near the caudal, which last consists of two rounded lobes. Ventrals with from eight to eleven rays. Air-vessel heart-shaped, situated in the abdomen, and attached to the bodies of the second to the fourth vertebræ: axillary pore, if present, minute.

Geographical distribution.—Fresh waters of India, Burma, and the East Indian Archipelago.

Uses.—Good eating, and thrives well in tanks, especially if they have grassy margins.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Wallago attu*, D. $\frac{1}{4}$, A. 86-93. Silvery. India and Burma.

1. Wallago attu, Plate CXI, fig. 4.

Silurus attu and *athu*, Bloch, Schneider, p. 378, t. 75.
Silurus, Russell, Fish. Vizag. and *Wallago*, ii, p. 50, pl. 165.
Silurus boalis, Ham. Buch. Fish. Ganges, pp. 154, 375, pl. 29, f. 49; Jerdon, M. J. L. and Sc. 1849, p. 335.

* I have to thank the Captain of the steamer in which I travelled through the Sunderbunds for having a bag net set whenever we were at anchor: it was attached to a spar fixed at right angles to the vessel, and sunk to about two feet below the surface. The strong tides swept into it a quantity of small fish and crustacea. The net was examined every two hours.

Silurus wallago, Cuv. and Val. xiv, p. 354; Jerdon, M. J. L. and Sc. 1849, p. 333.
Silurus asotus, Cuv. and Val. xiv, p. 358.
Callichrus macrostomus, Swainson, Fishes, ii, p. 306.
Schilbe boalis, Sykes, Trans. Zool. Soc. ii, p. 368, t. 64, f. 3.
Silurus Mülleri, Bleeker, Verh. Bat. Gen. xxi, Silur. Consp. p. 18.
Wallagoo Mülleri and *asotus*, Bleeker, Nat. Tyds. Ned. Ind. iii, p. 585, and Beng. en Hind. p. 108.
Wallagoo Russellii, Bleeker, Beng. p. 54, Prod. Silur. p. 261, and Atl. Ich. Silur. t. 86, f. 1; Blyth, P. A. S. of B. 1858, p. 283.
Wallagoo attu, Bleeker, Atl. Ich. Silur. p. 79; Günther, Catal. v, p. 36; Day, Fishes of Malabar, p. 193.
Wah-lah, Mal. and Tam.; *Mul-la* and *Pi-i-kee* and *Jer-i-kee*, Sind.; *Boyari*, Beng.

B. xix-xxi, D. 5, P. 1/13-15, V. 8-10, A. 86-93 ($\frac{4}{82-89}$), C. 17, Vert. 13/56.

Length of head 5 to 5½, of caudal 9, height of body 6½ in the total length. *Eyes*—with free lids, diameter 2/15 of length of head, 2 diameters from end of snout. Width of head rather less than its length, and equals half its height. Snout rather produced. Cleft of mouth extending to about 1 diameter behind the orbit, the lower jaw being slightly the longer. *Barbels*—the maxillary twice as long as the head, mandibular ones as long as the snout. *Teeth*—generic. *Fins*—the dorsal nearly as long as the pectoral, which last equals in length the depth of the cleft of the mouth. Pectoral spine finely serrated internally. Anal not confluent with the caudal, which last consists of two rounded lobes. *Air-vessel*—of moderate size, somewhat heart-shaped, situated in the front portion of the abdomen, and attached to the anterior vertebræ. *Colours*—uniform, fins sometimes covered with fine dots.

Habitat.—Throughout India, Ceylon and Burma. It attains at least six feet in length, and is good eating, but is a voracious and not very cleanly feeder. A stuffed specimen in Calcutta is 4½ feet long.

Genus, 14—Silurus, *Artedi.*

Parasilurus; pt. Bleeker.

Dorsal profile nearly horizontal: head covered with soft skin. Gill-openings wide, the gill-membranes not confluent with the skin of the isthmus, and deeply notched, Mouth transverse. Eyes subcutaneous, situated above the level of the angle of the transversely placed mouth. Nostrils remote from one another. Barbels six (Silurus, Bleeker) *: or four (Parasilurus,* Bleeker) *: one pair being maxillary, and one or two pairs mandibular. Teeth cardiform or villiform in the jaws, in one or two transverse bands on the vomer, none on the palatines. One very short and spineless first dorsal fin, but no adipose one: anal terminates close to the caudal but is not usually continuous with it: ventrals situated posterior to the dorsal, and consisting of eight or more rays. Air-vessel in the abdominal cavity, not enclosed in bone.*

Geographical distribution.—In India and Burma this genus is represented in the ghauts on the Western coast: along the Himalayas from Afghanistan to Darjeeling also in the hills above Akyab and in the Tenasserim provinces to Cochin China and beyond. These fishes, so far as I know, have not been recorded from waters of the plains of India.

SYNOPSIS OF SPECIES.

A. *With six barbels* (*Silurus.*)

1. *Silurus Wynaadensis*, A. 58-62. Vomerine band of teeth interrupted. Leaden, shot with purple. Wynaad hills in Madras.

B. *With four barbels* (*Parasilurus*).

2. *Silurus Afghana*, A. 70-78. Vomerine band of teeth uninterrupted. Purplish brown. Himalayas from Afghanistan to Darjeeling.
3. *Silurus Cochinchinensis*, A. 62-64. Vomerine band of teeth interrupted. Leaden, shot with purple. Hills above Akyab and Tenasserim, to Cochin China.

A. *With six barbels.*

1. Silurus Wynaadensis, Plate CXI, fig. 6.

Silurus punctatus, Day, Proc. Zool. Soc. 1868, p. 155 (not Cantor).
Silurus Wynaadensis, Day, Proc. Zool. Soc. 1873, p. 237.

B. xii-xiv, D. 5, P. 1/10, V. 8, A. 58-62 ($\frac{2}{56-60}$), C. 19.

Length of head 6 to 7, of caudal 10, height of body 8 to 8½ in the total length. *Eyes*—small, situated just above the angle of the mouth, from 2½ to 3 diameters from the end of snout, and 5 apart. The greatest width of the head equals its length behind the nostrils, lower jaw slightly the shorter and rather elevated in its centre. Width of the gape of the mouth equals the postorbital length of the head. A row of large open pores along the lower jaw and across the cheeks. *Barbels*—the maxillary nearly twice as long as the head, the mandibular pair on each side situated one anterior to the other at a distance equalling one diameter of the orbit, both extend nearly to the base of the pectoral fin. *Teeth*—two oval patches on the vomer divided by a short interspace. *Fins*—dorsal small, situated anterior to the origin of the ventral. Pectoral with a short but

strong spine ending in a soft termination. Ventrals reach the origin of the anal, the latter is divided from the rounded caudal by a notch. *Colours*—leaden, becoming purplish beneath and covered all over with small black points: some specimens have a dark finger mark on the shoulder.

Habitat.—Wynaad, in a stream about 3000 feet above the level of the sea, where Mr. Burnett obtained them, they are said never to exceed 12 inches in length.

B. *With four barbels.*

2. Silurus Afghana, Plate CXII, fig. 1.

Günther, Catal. v, p. 34.
Silurus Dukai, Day, Proc. Zool. Soc. 1873, p. 239.

D. 2, P. 1/13-14, V. 10, A. 70-78, C. 19.

Length of head 6 to $6\frac{1}{2}$, of caudal 9 to 12, height of body 9 to 12 in the total length. *Eyes*—small, situated above and behind the angle of the mouth and in the anterior half of the head: the width of the interorbital space rather exceeds 1/2 the length of the head. Upper jaw slightly the longer. *Barbels*—four, the maxillary reach the base of the ventral, the single mandibular pair as long as the head. A single row of six widely separated open glands under the mandible. *Teeth*—in a single uninterrupted horse-shoe shaped band on the vomer. *Fins*—the pectoral as long as the head behind the eyes, rounded, its spine moderately strong, short, entire, and having a soft termination: dorsal fin rudimentary,* and in the anterior third of the total length excluding the caudal fin: anal and caudal scarcely united. *Colours*—uniform, purplish-black or brown.

Habitat.—The Himalayas: Griffith sent it from Afghanistan. I received several specimens from Dr. Duka, who obtained them at Darjeeling, and Jerdon presented some to the British Museum, the largest of which is about 7·2 inches in length, the locality is not stated but they probably came from either the Cashmere or Assam regions. The specimen figured (life-size) was from Darjeeling.

3. Silurus Cochinchinensis, Plate CXIII, fig. 2.

Cuv. and Val. xiv, p. 352; Günther, Catal. v, p. 34; Day, Proc. Z. S. 1869, p. 583.
Silurichthys Berdmorei, Blyth, P. A. S. of Beng. 1860, p. 156.

B. xiv-xv, D. 4, P. 1/11, V. 10, A. 62-64 ($\frac{2}{60-62}$), C. 17.

Length of head 6 to $6\frac{1}{2}$, of caudal $7\frac{1}{2}$, height of body $6\frac{1}{2}$ in the total length. *Eyes*—minute, situated in the commencement of the anterior half of the head, and above the angle of the mouth. Upper jaw slightly the longer. The width of the head equals its length behind the nostrils. *Barbels*—the maxillary about twice the length of the head, the mandibular pair rather shorter than the head. *Teeth*—in two oval spots on the vomer divided by a smooth interspace. *Fins*—dorsal arises anterior to the origin of the ventral. Pectoral with a short but strong and scarcely serrated spine: ventrals extend to the origin of the anal, which last is slightly joined to the caudal, the latter being rounded. *Colours*—leaden, purplish below, and covered all over with minute black points, which sometimes form an irregular finger mark on the shoulder. Caudal sometimes yellow.

Habitat.—The hill ranges above Akyab, Tenasserim from whence Major Berdmore sent a specimen to the Calcutta Museum, and Cochin China.

Genus, 15—CHACA, *Cuvier and Valenciennes.*

Branchiostegals six to eight. Head large, depressed. Gape of mouth very wide: lower jaw prominent. Gill-openings somewhat contracted, the membranes confluent with the skin of the isthmus. Eyes minute and subcutaneous. Barbels six,† one maxillary and two mandibular pairs. Teeth villiform in both jaws, palate edentulous. Two rayed dorsal fins, the first having one strong spine and three or four rays, the second confluent with the caudal. Two rayed anal fins, the first with from eight to ten rays, the second somewhat longer and confluent with the caudal. Ventral with six rays, and situated behind the vertical of the first dorsal. Air-vessel rather large, somewhat cardiform in shape, concave anteriorly, lying across the bodies of the anterior vertebræ and not enclosed in bone. No axillary pore.

Geographical distribution.—Large rivers of Bengal, Assam, and Burma, and sluggish fresh-waters in their vicinity. It extends as far as the Malay Archipelago.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Chaca lophioides*, D. $\frac{1}{3-4}$ | 19-25, A. 8-10 | 8-12. Brownish, marbled with darker. Ganges, Brahmaputra and Irrawaddi rivers.

1. Chaca lophioides, Plate CXII, fig. 2.

Platystacus chaca, Ham. Buch. Fish. Ganges, pp. 140, 374, pl. 28, f. 43.
Chaca lophioides, Cuv. and Val. xv, p. 445, pl. 451; Val. in Bel. Voy. Ind. Ori. Zool. Poissons, pl. iv, f. 2; Günther, Catal. v, p. 29; Kner, Sitz. Wien, Akad. 1855, xvii, p. 101, t. i, f. 2-6.

* In my Darjeeling specimens, which are small, this fin is comparatively larger than those in the British Museum.
† If eight, a nasal pair exists.

Chaca buchanani, Günther, Catal. v, p. 29.
Coor-cur-riah, Ooriah; *Pĕmā*, Bhāgŭlpūr, (Ham. Buch.).

B. vi, D. 1/3-4 | 19-25, P. 1/5, V. 6, A. 8-10 | 8-12, C. 11.

Length of head 3, of caudal 6 to 8, height of body 6 in the total length. *Eyes*—small, in the anterior fourth of the head, the width of the interorbital space equals half the length of the head, and along it runs a deep central groove. Head strongly depressed, its width equals its length behind the angle of the mouth. Mouth very wide. Head and body in specimens from India having short tentacles and a ring of them round the eyes, and several along the edge of the lower jaw, such were not present in a specimen I captured in the Irrawaddi. *Fins*—Dorsal spines slightly serrated on both sides, pectoral spine serrated internally. A few tentacles along the lateral-line. *Colours*—brownish, marbled with darker.

In the British Museum Catalogue is "*a*. Adult: stuffed. Nepal. Presented by B. H. Hodgson, Esq." This locality I think rather doubtful, especially as the sea and estuary *Therapon jarbua*, Forskal, or *T. servus*, Bloch, is said to have been received "half-grown: stuffed (Nepal. ?) Presented by B. H. Hodgson, Esq." Labels so often become misplaced in Museums or in transit, that without further evidence I am doubtful if this fish can be admitted into the Nepal Fauna. I once examined some of Schlagintweit's specimens in a Museum, and found an *Exocœtus* labelled as from Cashmere!

Ham. Buchanan observes "of all the horrid animals of this tribe the *Chaka* of this district is the most disagreeable to behold. It has the habit of the fishes called by Lacépède *Uranoscope* and *Cotté*, that is, it conceals itself among the mud from which, by its lurid appearance, and a number of loose filamentous substances on its skin, it is scarcely distinguishable, and with an immense open mouth it is ready to seize any small prey that is passing along. In order that it may see what is approaching, the eyes are placed on the crown of the head. All persons turn away from it with loathing."

Habitat.—Brahmaputra, Ganges, and Irrawaddi rivers, also tanks in connection with them: there is a specimen in the Calcutta Museum 5 inches long, said to have come from the "Bay of Bengal." It attains at least 8 inches in length. The one figured (life-size) was from Debrooghur in Assam, taken in February, 1874.

Genus, 16—Plotosus, *Lacépède.*

Platystachus, Bloch; *Copidoglanis*, Günther.

Branchiostegals nine to twelve. Gill-openings wide, the membrane not being confluent with the skin of the isthmus, and separated by a deep notch. Head depressed covered with thin skin: gape of mouth transverse. Eyes with a free circular margin. Nostrils remote from one another: the anterior tubular and on the front edge of the snout, the posterior patent. Barbels eight. Teeth conical in the upper, mixed in the lower jaw: molariform on the vomer. Two rayed dorsal fins, the first with one spine and four or five rays: the second many rayed and confluent with the caudal, as is also the anal. A pectoral spine. Ventral fin many rayed (12). *Air-vessel of moderate size, and not enclosed in bone. A dendritic post-anal apparatus.*

Genus *Copidoglanis*, Günther, is divided from the foregoing, having the first branchial arch with a free membrane along the hinder edge of its concave side, and head rather depressed. *Plotosus* having the "branchial arches without particular cartilaginous posterior processes, and without posterior membrane. Head depressed."

Geographical distribution.—From the east coast of Africa through the seas and estuaries of India and Burma to Polynesia and Australia.

SYNOPSIS OF SPECIES.

1. *Plotosus canius*, D. $\frac{1}{5}$, 2 D + C + A 244-271. Uniform brownish. Coasts and estuaries of India, Burma, and the Straits.
2. *Plotosus Arab*, D. $\frac{1}{4-5}$, 2 D + C + A 169-189. Brown, with two longitudinal white bands. From Red Sea and East coast of Africa to Japan and Polynesia.

1. **Plotosus canius,** Plate CXII, fig. 3.

Ham. Buch. Fish. Ganges, pp. 142, 374, pl. xv, f. 44; Cuv. and Val. xv, p. 425; Bleeker, Beng. p. 125, and Pro. Sil. p. 318, and Atl. Ich. Silur. p. 99, t. 96, f. 2; Kner, Sitz. Wien, Acad. xvii, p. 157, and Novara Fische, p. 300; Blyth, Proc. A. S. of Beng. 1858, p. 286; Günther, Catal. v, p. 25.
Plotosus unicolor, (Kuhl and v. Hass.) Cuv. and Val. xv, p. 426; Bleeker, Silur. Batav. p. 58.
Plotosus horridus, viviparus et *multiradiatus*, Bleeker, l. c. pp. 59, 60.
Plotosus cæsius, Hyrt. Acad. Wiss. Wien, 1859, xvi, p. 17.
Irung-kellettee, Tamil.

B. xi-xiii, D. $\frac{1}{5}$, 2 D + C + A 242-271, P. 1/10-11, V. 12, Vert. 15/65.

Length of head $4\frac{1}{2}$ to $5\frac{1}{2}$, height of body 7 to $7\frac{3}{4}$ in the total length. *Eyes*—diameter 10 to 11 in the length of the head, the width of the interorbital space $2\frac{1}{2}$ to $2\frac{3}{4}$ in the length of the head. The width of the head equals its length behind the angle of the mouth. *Barbels*—the nasal nearly reach the nape, the maxillary the end of the opercle or base of the pectoral, whilst the outer mandibular pair are slightly longer than

the inner ones. *Fins*—dorsal spine serrated on both edges, and equal to 2/5 of the length of the head, pectoral spine similar and equal to 1/3 of the length of the head. *Colours*—brown, the vertical fins edged with black.

Plotosus limbatus, C. V. xv, p. 422; Günther, Catal. v, p. 25, is said to differ in its 2 D + C + A=224 rays: its head and also its nasal barbels being a little shorter.

Bleeker observes that the Malays at Batavia believe that the flesh of this fish has emmenagogue properties.

Habitat.—Estuaries of India and Burma to the Malay Archipelago. It attains 3 feet and upwards in length.

2. Plotosus Arab, Plate CXII, fig. 4.

Silurus Arab, Forsk. Desc. Anim. xvi, No. 36.

Platystacus anguillaris, Bloch. viii, p. 61, t. 373, f. 1; Bl. Schn. p. 373, t. 74; Shaw, Zool. v, p. 30, t. 99; Russell, Fish. Vizag. ii, p. 51 and *Ingelee*, f. 166.

Plotosus anguillaris, Lacép. v, p. 130, pl. 3, f. 2; Cuv. Règ. Anim.; Rüppell, N. W. Fische, p. 76; Cantor, Mal. Fish. p. 264; Peters, in Wiegm. Arch. xxi, p. 267; Bleeker, Silur. p. 314; Günther, Catal. v, p. 24.

Plotosus ikapor, Less. Voy. Coq. Zool. ii, pl. 31, f. 3.

Plotosus marginatus, Bennett, Life of Sir S. Raffles, p. 691.

Plotosus lineatus, Cuv. and Val. xv, p. 412; Rich. Ich. China, p. 286; Schleg. Fauna Japon. Poiss. p. 228, pl. 104, f. 3; Bleeker, Silur. Batav. pp. 4, 17, 57.

Plotosus castaneus, Cuv. and Val. xv, p. 421.

Plotosus vittatus, Swainson, Fishes, ii, p. 307.

Clarias anguillaris, Swainson, Fishes, ii, p. 307.

Plotosus castaneoides, Bleeker, Nat. Tyds. Ned. Ind. ii, p. 490.

Plotosus Arab, Bleeker, Atl. Ich. Silur. p. 98, t. 95, f. 2; Kner. Novara Fische, p. 300; Day, Fishes of Malabar, p. 195; Klunz. Verh. z. b. Ges. Wien, 1871, p. 588.

Moorghee, Mal.

B. xi, D. $\frac{1}{4-5}$, 2 D + C + A 169-190, P. 1/11, V. 12, Vert. 12/35.

Length of head 5 to $5\frac{1}{2}$, height of body 7 to 8 in the total length. *Eyes*—diameter 5 to $6\frac{1}{2}$ of, and situated in the middle of the length of head, the width of the interorbital space equals 1/3 of the length of the head. Greatest width of the head equals its length behind the angle of the mouth. Upper jaw slightly the longer, the width of the gape of the mouth equalling 2/5 of the length of the head. *Barbels*—the nasal reach the hind edge of the eyes, the maxillary 1/2 to 2/3 as long as the head, the mandibular ones are shorter. *Fins*—dorsal spine rather strong, 1/3 as long as the head and serrated on both sides. *Colours*—chestnut-brown, with two bluish-white longitudinal bands, the superior proceeding from above the eye along the base of the dorsal fin, the inferior from the maxilla along the middle of the side of the body. Bleeker observes that these bands entirely disappear in adults. Vertical fins with black edges.

Wounds from the pectoral spines of this fish are much dreaded by the natives of India as occasioning phlegmonous inflammation or even tetanus.

Habitat.—From the Red Sea and East coast of Africa through the seas of India to Japan and Polynesia.

B. *Air-vessel more or less enclosed in bone.**

Genus, 17—CLARIAS, *Gronovius*.

Macropteronotus, Lacépède; *Cossyphus* and *Phagorus*, McClelland.

Branchiostegals seven to nine. Gill-openings wide, the membranes not being confluent with the skin of the isthmus, and separated by a deep notch. A dendritic accessory branchial apparatus attached to the convex side of the second, third, and fourth branchial arches is received into a recess above and behind the usual gill-cavity. Head depressed, gape of mouth of moderate extent, anterior and transverse. Eyes small, with a free circular margin. Barbels eight. Teeth villiform in the jaws and in a band across the vomer. Dorsal fin long and spineless, extending from the neck to the caudal, with which it may be continuous: no adipose fin. Ventral with six rays. Pectoral with a spine. Air-vessel small, transverse, lobed, and enclosed in bone.

Mr. Kitchen-Parker, F.R.S. (on the shoulder girdle, Ray Society, 1868, p. 29) observes of the air-vessel and its surroundings in *Clarias*. "The remarkable trumpet-shaped cavities belong to the Atlas and Axis vertebræ, and they are strongly attached to the post-temporals and clavicles at their point of junction: they lodge the lateral cornua of the three lobed air-bladder. These cavities are very imperfect below: but this deficiency is largely supplemented by a transverse splint on each side, attached, below to the anterior edge of the great cylinder of the atlas. There is a smaller splint in each cavity, and two smaller splints eke

* This provisional subdivision of the Siluroids is adopted merely for the sake of convenience. A considerable number of dissections will be necessary before the grouping of this family can be satisfactorily arranged. In some of those forms in which the air-vessel is partially enclosed in bone such is effected by the auditory ossicles, in others by being enclosed in osseous capsules formed from a vertebra, or ossified to the vertebræ. Placing the amphibious *Clarias* in the same sub-family with *Plotosus* and *Chaca*, and putting the amphibious *Saccobranchus* in another sub-family along with the non-amphibious *Silurus*, *Wallago*, and *Eutropiichthys* does not seem natural. I have here followed Bleeker in placing the amphibious *Clarias* next to the equally amphibious *Saccobranchus*.

out the mouth of each of these trumpets. The large obliquely transverse splints (they are sometimes turned backwards) meet within a line and a half below the centrum of the atlas, between and behind the splints. This and the next centrum are deeply grooved."

Geographical distribution.—Throughout Africa and western Asia to India, Ceylon, Burma, Siam, the Malay Archipelago, Hong-Kong, the Philippines and beyond. These fish being amphibious live for some time after removal from their native element.

Uses.—Considered by the natives of India as exceedingly wholesome and invigorating.

SYNOPSIS OF SPECIES.

a. Vertical fins confluent with the caudal.

1. *Clarias jagur*, D. 53, A. 50.

b. Vertical fins not united to the caudal.

2. *Clarias Teysmanni*, D. 70-77, A. 53-63. Vomerine teeth obtuse. Ceylon, Java.
3. *Clarias Dussumieri*, D. 69-70, A. 50-59. Pectoral spine externally serrated. Vomerine teeth very obtuse. Malabar, Pondicherry to the Malay Archipelago.
4. *Clarias magur*, D. 62-76, A. 45-58. Vomerine teeth villiform. India, Burma, and Ceylon to the Malay Archipelago.
5. *Clarias Assamensis*, D. 64-68, A. 46-50. Vomerine teeth obtuse and in two pyriform bands. Assam.

A. *Vertical fins confluent with the caudal.*

1. Clarias jagur.

Macropteronotus jagur, Ham. Buch. Fish. Ganges, pp. 145, 374.
Clarias jagur, Cuv. and Val. xv, p. 388; Bleeker, Beng. p. 58.

D. 53, P. 1/7, V. 6, A. 50, C. 14.

"On the crown of the head is one oval cavity." Nasal barbels as long as the head, maxillary slightly longer: the two outer mandibular are a little longer than the inner, and reach to the back of the head. *Teeth*—it is stated there are none on the palate. *Colours*—superiorly blackish-green, below whitish, whilst the sides are slightly variegated with clouds. The fins are of the same colour with the parts on which they are inserted.

This fish I have never seen although I have searched for it in numerous places, the nearest approach has been a mutilated *C. magur*. Hamilton Buchanan does not record where he procured it, and on examining his MSS. list of fishes obtained in each several district, no allusion is made to it, neither is a figure of it amongst his drawings. It is probably therefore an estuary form.

Habitat.—? It is said to be larger than *C. magur*, attaining a foot-and-a-half in length.

B. *Vertical fins not confluent with the caudal.*

2. Clarias Teysmanni.

Bleeker, Nat. Tyds. Ned. Ind. xiii, p. 344, Prod. Silur. p. 348, and Atl. Ich. Silur. p. 104, t. 99, f. 1: Günther, Catal. v, p. 19.
? *Clarias brachysoma*, Günther, Catal. v, p. 20.

B. xi, D. 70-77, P. $\frac{1}{7-10}$, V. 6, A. 53-63, C. 17, Vert. 16/41.

Length of head to end of opercle 5 to $5\frac{1}{2}$, height of body $6\frac{1}{2}$ to $7\frac{1}{2}$ in the total length. *Eyes*—situated in the commencement of the second third of the total length of the head to the end of the occipital process. The greatest width of the head equals its length to hind edge of opercle. Head nearly smooth. Occipital process 2/3 as long as wide at its base. *Barbels*—the nasal as long as the head, the maxillary reach the end of the pectoral fin, the mandibular ones are shorter. *Teeth*—those on the vomer somewhat obtuse, forming a crescentic band which in its centre is of about equal width to the premaxillary band. *Fins*—the pectoral extends nearly to below the origin of the dorsal fin, its spine moderately strong, more than 2/3 the length of the fin, rugose or finely serrated along its outer edge, serrated internally. Caudal free. *Colours*—brownish.

Amongst the types of *C. brachysoma*, in the British Museum, the number of anal rays vary from 53 to 60, the fish appears to me to be similar to *C. Teysmanni.*

Habitat.—Ceylon and Java.

3. Clarias Dussumieri.

Cuv. and Val. xv, p. 382; Jerdon, M. J. L. and Sc. 1849, p. 342; Day, Fishes of Malabar, p. 197.
Clarias melanoderma, Bleeker, Silur. Batav. p. 54, and Prod. Sil. p. 341, and Atl. Ich. Silur. p. 102, t. 97, f. 2; Günther, Catal. v, p. 19.
Clarias (melanosoma) melasoma, Bleeker, Nat. Tyds. Ned. Ind. iii, p. 427.

B. xi, D. 69-70, P. $\frac{1}{8}$, V. 6, A. 50-59, C. 16.

Length of head to end of gill-cover 6, of caudal 9, height of body $8\frac{3}{4}$ in the total length. *Eyes*—in the commencement of the front third of the distance betweeu the end of the occipital process aud the snout: the width of the interorbital space equal to 1/2 the length of the head. The greatest width of the head equals its length: its upper surface finely shagreened and covered with skin, on it are two depressions, the anterior which is oblong extends to opposite the front margin of the eyes, the posterior which is oval is midway between the posterior end of the anterior depression and that of the occipital process, which last is scarcely produced and $3\frac{1}{2}$ times as wide at its base as it is long. *Barbels*—the nasal reach the hind edge of the eye, the maxillary to the base of the pectoral fin, those on the lower jaw are shorter. *Teeth*—those on the palate with

globular heads and in an uninterrupted curved band, which is rather wider than those on the premaxillaries. *Fins*—pectoral spine rather strong, its length equals 1/2 the distance between the base of the occipital process and the end of the snout, it is rather strongly serrated externally with a few recurved spines near its extremity, more feebly internally, whilst the length of the fin only equals 1/2 the distance between its base and that of the ventral, it does not quite reach to below the origin of the dorsal. Caudal distinct from the other vertical fins.

I only procured one specimen (7 inches long) from the Wynaad in Malabar. Jerdon seems to have obtained it from tanks and ditches in Malabar. The length of the entire head is 1/4 of the total excluding the caudal fin. It appears to agree with Bleeker's Malay form.

Habitat.—Malabar and Pondicherry to the Malay Archipelago.

4. Clarias magur, Plate CXII, figs. 5 and 5A.

Silurus batrachus, Bl. t. 370, f. 1; Bl. Schn. p. 386.

Silurus anguillaris, Russell, Fish. Vizag. ii, p. 53 and *Marpoo*, pl. 108.

Macropteronotus batrachus, Lacép. v, pp. 84, 85.

Macropteronotus magur, Ham. Buch. Fish. Ganges, pp. 146, 374, pl. 26, f. 45.

Clarias marpus et *batrachus*, Cuv. and Val. xv, pp. 378, 385; Bleeker, Beng. p. 58.

Clarias magur, Cuv. and Val. xv, p. 381; Jerdon, M. J. L. and Sc. 1849, p. 342; Bleeker, Beng. pp. 58, 124; Blyth, Proc. A. S. of B. 1858, p. 286; Günther, Catal. v, p. 17; Day, Fish. Mal. p. 196.

Clarias punctatus, Cuv. and Val. xv, p. 384; Bleeker, Verh. Bat. Gen. xxi, Sil. Batav. p. 53; Cantor, Mal. Fish. p. 263.

Clarias batrachus, Jerdon, M. J. L. and Sc. 1849, p. 342; Bleeker, Prod. Silur. p. 343, and Atl. Ich. Silur. p. 103, t. 98, f. 2; Kner, Novara Fische, p. 299.

Kug-ga, Punj.; *Mah-gur*, Beng.; *Magurah*, Ooriah; *Nga-khoo*, Burmese and Mugh. "*Măngrí*, Patna, and Monghir, H. Buch."

B. ix, D. 62-76, P. $\frac{1}{8-11}$, V. 6, A. 45-58, C. 15-17.

Length of head to end of gill covers $5\frac{2}{3}$, of caudal $8\frac{3}{4}$, height of body $6\frac{1}{2}$ to $7\frac{1}{2}$ in the total length. *Eyes*—diameter 8 in the length of the head, 2 to $2\frac{1}{2}$ diameters from the end of snout, the width of the interorbital space equals 1/2 the length of the head. The greatest width of the head equals its length. Upper jaw the longer, the width of the gape of the mouth equals 4/9 of the length of the head. Head shagreened superiorly and covered with fine granules. Two depressions on the head, the anterior oblong and situated so that its first fourth is between the eyes: the posterior oval aud placed midway between the posterior extremity of the anterior fossa and the end of the occipital process. Occipital process rounded behind, the width of its base equalling rather above twice in its length. *Barbels*—the nasal reach the base of the occipital process: the maxillary the base or middle of the pectoral fin, the mandibular ones shorter. *Teeth*—on the vomer villiform, not so fine as those in the jaws and becoming a little blunted with age, they form an uninterrupted band which in its centre is rather narrower or as wide as the premaxillary band. *Fins*—pectoral fin reaches to below the commencement of the dorsal, its spine finely serrated* but covered with skin. Hamilton Buchanan observed that its edges were unindented: and in Cuv. and Val. the same fact is recorded of some Bengal specimens. Caudal free. *Colours*—dingy green or brownish superiorly, becoming lighter beneath: the vertical fins usually with reddish margins.

Habitat.—Fresh and brackish waters of the plains of India, Burma, Ceylon, and the Malay Archipelago. It lives long after its removal from its native element, being amphibious. It attains at least a foot and a half in length. As food it is deemed highly nourishing.

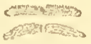
5. Clarias Assamensis.

Mah-gur, Assamese.

B. ix, D. 64-68, P. $\frac{1}{8-11}$, V. 6, A. 46-50, C. 14.

Length of head to end of opercle $5\frac{3}{4}$ to $6\frac{1}{4}$, of caudal $8\frac{1}{3}$, height of body $6\frac{1}{3}$ to 7 in the total length. *Eyes*—in the commencement of the anterior third of the total length of the head, width of the interorbital space equal to 2/5 of the total length of the head. The greatest width of the head equals its length between the

* The outer serration varies considerably, as a rule in Calcutta specimens they are blunt and nodulated, whilst the inner serrature is likewise very feeble. In Burma a minority of the specimens have the outer edge of the pectoral spine serrated, whilst the vomerine teeth are very slightly obtuse.

snout and the hind edge of the opercle: the width of the gape of the mouth equals 1/3 of the total length of the head. Upper surface of the head very finely shagreened and covered with thin skin: two depressions on the head, the anterior oblong and reaching forwards to between the middle of the eyes: the posterior oval and commences midway between the posterior end of the anterior fossa and the end of the occipital process, which latter is rounded, and twice as broad at its base as it is long. *Barbels*—the nasal reach to the base of the occipital process: the maxillary to the end of the pectoral spine: the mandibular ones are shorter. *Teeth*—those on the vomer in two pyriform bands  of globular ones, the widest end being internal where it exceeds the width of the premaxillary band. *Fins*—pectoral reaches to below the commencement of the dorsal fin and 1/2 way to the base of the ventral, its spine strong, 1/3 of the total length of the head, rough externally, serrated internally. Ventral reaches anal. Vertical fins not confluent with the caudal. *Colours*—greenish-brown, vertical fins edged with red.

This fish appears to take the place of *C. magur* in Assam, and I have procured it from Goalpara and as high as Suddya. Its teeth distinguish this from other species or perhaps varieties.

Habitat.—Upper and lower Assam.

Genus, 18—Saccobranchus, *Cuvier and Valenciennes.*

Heteropneustes, Müller.

Branchiostegals seven. Gill-openings wide, the membranes not being confluent with the skin of the isthmus, and separated by a deep notch. Gill cavity having an accessory posterior sac, which extends backwards on either side of the neural spines amongst the muscles of the abdominal and part of the caudal region. Head depressed, covered with very thin skin: mouth transverse. Eyes with a free circular margin. Barbels eight. Teeth present in the jaws and on the vomer. Dorsal fin short and spineless: ventral with six rays situated under the dorsal. Anal long and confluent with or separated from the caudal by a notch. Air-vessel placed transversely across the bodies of the anterior vertebra, where it is enclosed by bone, a duct passes upwards from either side of the air-vessel, unites, and opens into the inferior surface of the pharynx.*

Geographical distribution.—Fresh waters of India, Ceylon, Burma, and extending to Cochin China, but not found in the Malay Archipelago. Being amphibious (see p. 439) they can live long after their removal from the water.

Uses.—Considered exceedingly wholesome and invigorating by the natives of India, but in some places deemed by the Brahmins to be impure.

SYNOPSIS OF SPECIES.

A. *Anal fin united to the caudal.*

1. *Saccobranchus microps*, D. 8, A. 70. Eyes small. Ceylon.

B. *Anal fin separated from the caudal by a notch.*

2. *Saccobranchus fossilis*, D. 6-8, A. 60-79. India and Burma.

A. *Anal fin united to the caudal.*

1. Saccobranchus microps.

Günther, Catal. v, p. 31.

D. 8, P. 1/6, A. 70.

Length of head $7\frac{1}{2}$, height of body 8 in the total length. *Eyes*—much smaller than in *S. fossilis*, and less than 1/3 in the length of the snout. *Barbels*—the nasal ones reach the end of the pectoral: the maxillary the root of the ventral fin. *Teeth*—the vomerine band is interrupted in its centre. *Fins*—origin of the dorsal is 2/7 of the length (excluding the caudal fin) from the end of the snout. Pectoral spine feebly serrated, two thirds as long as head. Ventral fin reaching the anal, which last is united with the caudal. *Colours*—brown.

Habitat.—Ceylon, to 6 inches in length.

B. *Anal fin separated from the caudal by a notch.*

2. Saccobranchus fossilis, Plate CXIV, fig. 1.

Silurus fossilis, Bloch, t. 370, f. 2; Bl. Schn. p. 386; Swainson, Fishes, ii, p. 306.

Silurus singio, Ham. Buch. Fish. Ganges, pp. 147, 374, pl. 37, f. 46; Taylor, Gleanings in Science, June, 1830, p. 170 (on the air-bladder); Wyllie, Proc. Zool. Soc. 1840, p. 34; Hyrtl, Sitz. Akad. Wiss. Heft. 2, 1853, p. 305 (on the circulation, etc.)

Saccobranchus singio, Cuv. and Val. xv, p. 400, pl. 448; Bleeker, Beng. p. 58; Kner, Novara Fische, p. 302; Günther, Catal. v. p. 30; Day, Proc. Zool. Soc. 1869, p. 612, Fish. Malabar, p. 198.

Silurus laticeps, and *biserratus*, Swainson, Fishes, ii, p. 306, 393.

* See remarks on the amphibious nature of these fishes, p. 439.

Saccobranchus fossilis, Bleeker, Beng. p. 58; Jerdon, M. J. L. and Sc. 1849, p. 342; Günther, Catal. v, p. 31.

Silurus microcephalus, Günther, Catal. v, p. 31.

Bitchu ka mutchee, and *Singi*, Hind.: *Singee* and *Sheen-ee*, Assam: *Thay-lee*, Tam.: *Mar-pu*, Tel.: *Singee*, Ooriah, Beng. and N. W. Prov.: *Nga-gyee* and *Nga-kyee*, Burmese and Mugh.: *Lahoord* (young), *Nullie* (adult), Punj.: *Kahree-meen*, Mal.: *Lo-har*, Sind.: (*Kamacha singgi*, Bhāgālpūr, H. B.)

B. vii, D. 6-7, P. $\frac{1}{7}$, V. 6, A. 60-79, C. 19.

Length of head from $5\frac{1}{2}$ to 7, of caudal from about 9 to 14, height of body (greatly depending upon food or season) from 5 to 8 in the total length. The width of the head equals its length, and that of the gape of the mouth $2\frac{1}{4}$ to $2\frac{1}{2}$ in the length of the head. *Eyes*—from 2 to 3 diameters from end of snout. *Barbels*—the maxillary extend to the middle of the pectoral, or even the commencement of the ventral fins. *Teeth*—those on the vomer in a pyriform patch on either side, converging anteriorly, widely divergent posteriorly. *Fins*—the dorsal commences rather before the anterior third of the body: the ventrals reach to the third or fourth anal ray or just to the origin of that fin.* Pectoral spine serrated internally, also usually with a few serrations externally at its anterior end, it is from two-thirds to three-fourths as long as the head. Anal and caudal separated by a more or less distinct notch. *Colours*—leaden, sometimes with two longitudinal yellowish bands. The young are occasionally reddish.

Wounds from the pectoral spine of this fish are dreaded in India, as they are reputed to be very poisonous, even occasioning tetanus. As soon as captured, the offensive spine is broken off by blows with a stake, consequently it is difficult to procure a large and perfect specimen. Fishermen dread it so much that they would prefer cutting the meshes of their nets and allowing it to escape than endeavour to remove it uninjured. As food the flesh is esteemed for its invigorating qualities, and tanks are frequently stocked with them during the rainy season. When food is plentiful they fatten well, if the reverse they become lanky, thus altering the comparative height of the body to that of its length.

In a specimen captured at Bezwada, September 12th, 1868, the ova were fully developed: the colour of the eggs was of a pea-green.

Habitat.—Fresh waters of Sind, India, Ceylon, Burma, and Cochin-China, attaining a foot or more in length.

Genus, 19—Silundia, *Cuvier and Valenciennes.*

Branchiostegals eleven to twelve. Gill-openings wide, the gill-membranes overlapping but not confluent with the skin of the isthmus. Body elongated and compressed. Head covered with soft skin. Eyes lateral, with narrow adipose lids. Mouth rather wide, not cleft to so far as the eyes, lower jaw the longer. Nostrils, those on either side approximating, the anterior pair in front of the snout and a little external to the posterior pair. A pair of maxillary and sometimes also a pair of mandibular barbels. Villiform teeth in the jaws, and in an uninterrupted band on the palate. First dorsal fin with one spine and seven rays: the adipose short. Anal long (40-50 rays). Ventral with 6 rays, placed below or just behind the adipose dorsal. Air-vessel kidney-shaped, convex anteriorly, lying across the body of an anterior vertebra, from which it is separated by the aorta, having its lateral margins protected by bone. An axillary pore.

Geographical distribution.—Throughout the larger rivers of India and Burma.

SYNOPSIS OF SPECIES.

A. *Two pairs of barbels.*

1. *Silundia Sykesii*, A. 44-50. A pair of maxillary and also of mandibular barbels. Rivers of the Deccan to their terminations.

B. *One pair of barbels.*

2. *Silundia Gangetica*, A. 40-46. A pair of short maxillary barbels. Indus, Ganges, Jumna, and large rivers of Assam and Burma.

A. *A pair of maxillary and also mandibular barbels.*

1. Silundia Sykesii, Plate CXIV, fig. 2.

Day, Journ. Linn. Soc. Zool. xii, 1876, p. 569.

? *Ageneiosus Childreni*, Sykes, Trans. Zool. Soc. ii, p. 375, t. 66, f. 3.

? *Silundia Childreni*, Bleeker, Hind. p. 58; Jerdon, M. J. L. and Sc. 1849, p. 340.

Wal-la-ke kel-le-tee (slippery siluroid) and *Poo-nat-tee*, Tam.; *Wan-jou*, Tel.

B. xii, D. $\frac{1}{7}$ | 0, P. 1/12, V. 6, A. 44-50 ($\frac{2-3}{42-47}$), C. 19.

Length of head $5\frac{1}{4}$, of caudal $4\frac{2}{3}$, height of body $5\frac{3}{4}$ in the total length. *Eyes*—with a narrow, free, adipose lid, diameter $3\frac{1}{2}$ in the length of the head, 1 diameter from the end of snout, and $1\frac{1}{3}$ apart. The greatest width of the head equals its length behind the middle of the eyes: lower jaw the longer, curved upwards in the middle: snout rather broad: the width of the gape of the mouth equals 4/11 of the length of the

* In Assam the ventrals sometimes do not reach the anal fin.

head. *Barbels*—the maxillary ones reach the operele or even the base of the pectoral fin: the mandibular ones equal one diameter of the eye in length. *Teeth*—villiform in the jaws, in a crescentic band across the palate. *Fins*—dorsal spine weak, roughened anteriorly, finely serrated posteriorly and as long as the head excluding the snout: pectoral spine stronger, as long as the head behind the angle of the mouth, and reaching to above the ventral. Ventral arises behind the vertical from the last dorsal ray, and reaches to the anal. Caudal forked, the lower lobe rather the longer. Free portion of the tail nearly as high as long. *Colours*—bluish superiorly, becoming white on the sides and beneath, the fins stained externally with gray.

Sykes says his fish is termed *Purree*, Mahr. and *Sillun* in the Deccan, that it is *without cirri*, and also that the first bony ray is "serrated on the anterior edge," such being also shown in the figure.

The long maxillary barbels of this species serve to distinguish it from *S. Gangetica*, C.V.

Habitat.—Rivers of the Deccan and the Kistna and Godavery to their terminations.

B. *A pair of short maxillary barbels only.*

2. Silundia Gangetica, Plate CXIV, fig. 3.

Pimelodus silondia, Ham. Buch. Fish. Ganges, pp. 160, 375, pl. 7, f. 50.

Silundia Gangetica, Cuv. and Val. xv, p. 49, pl. 426; Bleeker, Beng. en Hind. pp. 58 and 118; Blyth, Proc. A. S. of Beng. 1858, p. 286; Günther, Catal. v, p. 65; Day, Journ. Linn. Soc. Zool. xii, 1876, p. 569.

Silonia lurida, Swainson, Fishes, ii, p. 306.

Silond, Punj.: *Jil-lung* and *Silond*, Ooriah and Bengal: *Wanjou*, Telugu.

B. xi-xii, D. $\frac{1}{7}$ | 0, P. 1/11-13, V. 6, A. 40-46 $({}_{36}{}^{4}{}_{44})$, C. 17.

Length of head $5\frac{1}{4}$, of caudal $5\frac{1}{2}$ to 6, height of body 5 to $5\frac{1}{4}$ in the total length. *Eyes*—with narrow anterior and posterior adipose lids, diameter 4 to $4\frac{1}{2}$ in the length of head, $1\frac{1}{4}$ to $1\frac{1}{2}$ diameters from the end of snout, and 2 apart. The width of the head equals its length excluding the snout, whilst its height is rather less. Lower jaw the longer, snout rather broad, the width of the gape of the mouth exceeding 1/2 the length of the head. *Barbels*—a pair of minute maxillary but no mandibular ones. *Teeth*—in the jaws villiform, and in a crescentic band across the palate. *Fins*—dorsal spine rather weak, as long as the head behind the middle of the eye, anteriorly smooth or rugose, posteriorly finely serrated in its upper portion. Pectoral spine stronger, as long as head without the snout, and serrated internally. Ventral arises under the posterior dorsal rays, and nearly reaches the anal. *Air-vessel*—small, with its lateral edges protected by a short osseous process from either side of the vertebra, but it cannot be said to be enclosed in bone. The air-vessel itself, when opened, is found to consist of two oval chambers, having a communicating canal, and in the young is almost surrounded by high osseous sides. *Colours*—bluish along the back, becoming silvery on the sides, fins stained with gray.

Habitat.—Estuaries of India and Burma, ascending high up the larger rivers to nearly their sources. It attains 6 feet or more in length, and is called "a shark" by the natives. It is very voracious.

Genus, 20—AILIA, *Gray*.

Branchiostegals eight. Gill-openings wide, the gill-membranes not confluent with the skin of the isthmus. Body elongated and strongly compressed. Head covered with thin skin. Eyes nearly or quite behind the angle of the mouth, and with adipose lids. Upper jaw slightly the longer. Nostrils patent, those on either side approximating, the anterior in front of the snout. Eight barbels. Villiform teeth in the jaws and in two minute patches on the vomer. No anterior, but a small adipose dorsal fin posteriorly. Pectoral with a spine. Ventral with six rays. Anal long (59-75 rays). Caudal forked. Air-vessel tubiform, lying across the body of an anterior vertebra, from which it is separated by the aorta, whilst externally it is protected by bone. No axillary pore.*

Geographical distribution.—Sind, the larger rivers of the Punjab, N. W. Prov. Bengal, Assam and Orissa.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Ailia coila*, V. 6, A. 59-75. Silvery, fins usually with dark edges. Indus, Jumna, Ganges, Brahmaputra, and Mahanuddee rivers.

1. Ailia coila, Plate CXIV, fig. 4.

Malapterurus coila, Ham. Buch. Fish. Ganges, pp. 158, 375.

Silurus (Acathonotus) Cuvieri, Gray and Hard. Ind. Zool.

Malapterus (Ailia) Bengalensis, Gray and Hard. Ind. Zool.; Swainson, Fishes, ii, p. 307.

Ailia Bengalensis, Gray, Zool. Misc. 1831, p. 8; Cuv. and Val. xv, p. 538; Günther, Catal. v, p. 56.

Acanthonotus Hardwickii, Gray, Zool. Misc. 1831, p. 8.

Melapterurus Cuvieri, Swainson, Fishes, ii, p. 307.

* In some specimens there is a small basal bone situated on the back anterior to the vertical from the origin of the ventral fin, otherwise I cannot discover a vestige of the first dorsal fin. However, Dr. Günther has discerned "a small hole in the skin where the dorsal fin ought to have been placed, it is a short distance from the occiput, and a little before the vertical from the ventral fins," Catal. v, p. 55.

Ailia coila, Bleeker, Beng. p. 54; Blyth, P. A. S. of Beng. 1858, p. 283.
Ailia affinis, Günther, Catal. v, p. 56.
Puttuli and *Buns putta*, "Bamboo leaf," Ooriah; *Mun-glee-ah-nee*, Sind.; *Vella kaluda*, Telugu; "*Kajoli*, Rangpur, *Basanguti*, Gorakpur, *Bătausi*, Bhagulpur," H. Buch.

B. viii, P. 1/14, V. 6, A. 59-75, C. 19.

Length of head 6 to 7, of caudal $5\frac{1}{2}$ to 8, height of body $5\frac{1}{4}$ to 6 in the total length. *Eyes*—diameter $3\frac{1}{2}$ to $3\frac{3}{4}$ in the length of the head, $1\frac{1}{4}$ diameters from the end of snout, and 1 apart. The greatest width of the head equals its length excluding the snout: the width of the gape of the mouth equals 1/3 of the length of the head. Upper jaw the longer, and rather overhung by the snout. Cleft of the mouth reaching 1/2 way to the orbit opposite the centre of the eye. *Barbels*—extend to the first 1/3 or middle of the length of the fish excluding its caudal fin. *Teeth*—generic. *Fins*—pectoral spine slender and about as long as the head. Ventral short. Anal with from 59 to 75 rays in my specimens, and most of the intermediate numbers may be found (*A. affinis* is given A. 60-61: *A. Bengalensis*, A. 70-72. One of the first specimens I captured at Delhi had A. 67). Caudal forked. In many specimens the neural spines just appear above the skin along the back. *Colours*—silvery, some of the fins often stained gray at their margins. The caudal, especially in Orissa specimens, is commonly orange edged with black.

This fish is excellent eating. There is a figure of it amongst Sir W. Elliot's drawings from the Telugu country, probably the Kistna.

Habitat.—From the Kistna and Orissa, throughout the Indus, Jumna, and Ganges, after they leave the hills to their termination; also Assam. It attains at least 7 inches in length. Ham. Buch. records it to 8 or 12 inches in length.

Genus, 21—Ailiichthys, *Day*.

*Similar to Ailia except that the ventral fins are absent.**

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Ailiichthys punctata*, A. 76-90. A black spot at the base of the caudal fin. Indus, rivers of the Punjab and the Jumna.

1. Ailiichthys punctata, Plate CXIV, fig. 5.

Day, Proc. Zool. Soc. 1871, p. 713.
Put-tas-si and *Put-tu-ah*, Punj.

P. 1/12, A. 76-90, C. 17.

Length of head 6 to 7, of caudal 6, height of body $5\frac{1}{2}$ in the total length. *Eyes*—situated more than half below the angle of the mouth, being partly on the lower side of the head, diameter 4/11 to 1/3 of length of head, 1/2 to 2/3 of a diameter from end of snout, 1 diameter apart. Body compressed, upper profile of the head slightly concave. Width of the head equals its postorbital length. Width of the gape of the mouth equals 1/3 of the length of the head. Upper jaw somewhat the longer, the cleft of the mouth only extending about half way to the anterior margin of the eye, and to opposite its centre. *Barbels*—much the same length and extend to the middle of the length of the fish. *Teeth*—villiform in the jaws. *Fins*—adipose dorsal minute. Pectoral spine nearly as long as the head: ventrals absent. Caudal forked, lower lobe the longer. *Colours*—silvery, upper surface of head nearly black, a large black spot before the base of the caudal fin.

Habitat.—Jumna below Delhi, also from the Indus in Sind, where I obtained numerous specimens up to 4 inches in length.

Genus, 19—Eutropiichthys, *Bleeker*.

Branchiostegals eleven. Gill-openings wide, the membranes not being confluent with the skin of the isthmus, but separated by a deep notch. Body and head compressed. Head covered with soft skin. Eyes with broad adipose lids. Cleft of mouth deep, extending to below the eyes: upper jaw slightly the longer. Nostrils wide and patent, the anterior and outer one being at the side of the snout. Eight barbels. Teeth in jaws sharp: and in a broad band across the vomer and palatines.† *First dorsal short, having one spine and seven rays: the adipose short. Pectoral*

* Professor Troschel (Wiegm. Arch. 1871, pp. 276-280) remarked upon having received a female specimen of the Siluroid *Copidoglanis brevidorsalis* destitute of a ventral fin, and considered such might be a sexual character. Dr. Günther (Zool. Record, 1871, p. 104) gave his opinion that the apodal specimen was more likely an instance of individual monstrosity, adducing as one reason that he had seen such in *Erythrinus*, *Ophiocephalus*, &c. Dr. Günther (Annal. and Mag. Nat. Hist. 1867, xx, p. 308) drew attention to the fact "that in numerous groups of fishes which live in mud, forms occur devoid of or with only rudimentary ventral fins." I have likewise found in Ireland abnormal examples of *Gasterosteus pungitius*, in which the ventrals were absent. In the case of the fish described above, out of many specimens, the ventral was absent in all. It however becomes a question whether the absence of this fin should be a sufficient characteristic on which to found a Genus. If not, the Genera *Channa*, *Apua*, &c. will have likewise to be suppressed.

† Having (Proc. Zool. Soc. 1869, p. 396) drawn attention to the statement in the definition of this Genus, of "no teeth on the palate," in the "Catalogue of Fishes of the British Museum," Dr. Günther (Zool. Record, 1869, p. 134) observed that "having received an example from Colonel Playfair some years ago, the Recorder has found the palatine teeth, which may be distinguished on a very 'superficial examination.'"

with a spine. Ventral with six rays and situated below the rayed dorsal. Anal long (47-50 *rays*). *Caudal forked. Air-vessel tubiform, and as in Ailia. No axillary pore.*

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Eutropiichthys vacha*, D. $\frac{1}{7}$, A. $\frac{3-4}{41-47}$. Silvery. India and Burma.

1. Eutropiichthys vacha, Plate CXIV, fig. 6.

Pimelodus vacha, Ham. Buch. Fish. Gang. pp. 196, 378, pl. 19, f. 64.
Bagrus vacha, Cuv. and Val. xiv, p. 392; Bleeker, Beng. p. 56.
Pachypterus punctatus, Swainson, Fishes ii, p. 306.
Eutropiichthys vacha, (Bleeker), Günther, Catal. v, p. 38; Day, Proc. Zool. Soc. 1869, p. 306.
Butchua and *Nandi-butchua*, Ooriah; *Chel-lee*, Sind.; *Nee-much*, N. W. Prov.; *Váchá*, Beng.; *Nga-myen-kouban* and *Katha-boung*, Burmese.

B. xi, D. $\frac{1}{7}$ | 0, P. 1/13-16, V. 6, A. $\frac{3-4}{41-47}$, C. 17.

Length of head $5\frac{1}{2}$ to $5\frac{3}{4}$, of caudal 5, height of body 5 to $5\frac{1}{2}$ in the total length. *Eyes*—with broad adipose lids, diameter $3\frac{1}{2}$ to $3\frac{3}{4}$ in the length of the head, 1 diameter from the end of snout, and 1 to $1\frac{1}{4}$ apart. Width of the head equals its length behind the middle of the eyes. Cleft of mouth rather oblique, its extent being 1/4 more than the width of the gape: the angle situated under the middle or hind third of the eyes: snout compressed and pointed, the upper jaw being slightly the longer. *Barbels*—the nasal pair reaching to the hind edge of the head or even slightly further: maxillary ones to the end of preopercle or even as long as the head: the mandibular ones, which arise on a transverse line across the chin, are rather shorter. *Teeth*—sharp ones in the jaws, in a pyriform band on the palatines, which with those on the vomer form an uninterrupted band, that nearly touches the band on the upper jaw. *Fins*—dorsal spine thin, serrated posteriorly, and usually as long as the head excluding the snout. Pectoral fin reaches the base of the ventral, its spine is rough externally, serrated internally, and as long as that of the dorsal. Ventral situated under the posterior dorsal rays, and only extends half-way to the anal. Free portion of the tail as high as long. *Colours*—silvery, grayish along the back: pectoral and caudal usually edged with black.

Variety *Eutropiichthys Burmannicus* has A. $\frac{4}{55}$, and its nasal barbels almost reach to the dorsal fin: the maxillary to the middle of the pectoral spine, whilst all the others are longer than the head. The pectoral spine is serrated externally, and reaches the anal fin.

Habitat.—From the Punjab through the large rivers of Sind, Bengal, Orissa, and variety *E. Burmannicus* in Burma. It attains upwards of a foot in length. It is good eating

Genus, 23—Amblyceps, *Blyth.*

Branchiostegals twelve. Gill-openings wide, the gill-membranes not confluent with the skin of the isthmus, notched as far forwards as the chin. No thoracic adhesive surface. Head covered with soft skin. Eyes small, subcutaneous. Mouth anterior: gape wide. Nostrils close together, the posterior having a barbel. Teeth in jaws villiform: palate edentulous. Anterior dorsal fin enveloped in skin, having one spine and six rays. Pectoral with a concealed spine. Ventral with six rays, inserted behind the vertical from the posterior margin of the rayed dorsal. Anal rather short (9 *to* 12 *rays*). *Caudal forked. Air-vessel almost entirely enclosed in bone. No axillary pore.*

Geographical distribution.—Small fishes inhabiting the fresh waters of India and Burma, usually on or near hills. Griffith observes (Cal. Journ. N. Hist. ii, p. 564) respecting certain fish from the Mydan Valley in Afghanistan, "the most remarkable fish is a dark coloured loach-like *Silurus*, which is not uncommon about Jubraiz."

I have a large series of this fish, and they show such diversities that it appears to me that all are varieties of one species.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Amblyceps mangois*, A. 9-12. Maxillary barbels to end of pectoral spine. Himalayas from Nangra and Darjeeling. Jumna and the Behar district, also Burma.

1. Amblyceps mangois, Plate CII, fig. 6, and CXVII, fig. 1.

Pimelodus mangois, Ham. Buch. Fish. Ganges, pp. 199, 379; Bleeker, Beng. p. 58.
Amblyceps mangois, Blyth, P. A. S. of Beng. 1860, p. 153; Günther, Catal. v, p. 190; Day, Proc. Zool. Soc. 1869, p. 524.
Amblyceps cæcutiens, Blyth, P. A. S. of Bengal, 1858, p. 282; Günther, Catal. v, p. 190.
Amblyceps tenuispinis, Blyth, l. c. 1860, p. 153; Günther, Catal. v, p. 190.
Akysis Kurzii, Day, Proc. Zool. Society, 1871, p. 703.
Billi, "a cat," and *Sudaal*, Punj.

B. xii, D. $\frac{1}{6}$ | 0, P. 1/7, V. 6, A. 9-12 ($\frac{2-3}{7-9}$), C. 19, Vert. 12/23.

Length of head $6\frac{1}{4}$, of caudal 6, height of body 7 to 9 in the total length. *Eyes*—small, situated in the anterior 2/5 of the head. Mouth wide, lower jaw somewhat the longer. *Barbels*—nasal as long as the head, and equalling the internal mandibular pair, the maxillary reach the end of the pectoral spine, whilst the outer mandibular ones are not quite so long. *Fins*—dorsal not so high as the body, and situated in the commencement of the second fifth of its total length, its spine about half as high as its rays, all are partly enveloped in skin, as are also those of the anal. Adipose dorsal low, the length of its base equalling that of the rayed fin, and two-thirds of the interspace between the two fins. Pectoral scarcely extending half way to the base of the ventral, which latter does not reach the anal. Caudal deeply forked, its upper lobe the longer. Caudal peduncle as high as long. *Lateral-line*—absent. *Air-vessel*—has a small rounded lobe on either side of the body of the second vertebræ, and all but a small portion of its front surface enclosed in bone. *Colours*—olive-brown, lightest beneath. In some a dark line commences opposite the opercles, and soon subdivides: one branch going to the centre of the base of the caudal, the other to the base of the anal.

Hamilton Buchanan observes it is found in the Purniah district. *A. tenuispinis*, Blyth, appears to be the young, Jerdon brought the specimen from Ghazeepore. *A. cœcutiens*, Blyth, came from Pegu and Moulmein. *A. Kurzii*, Day, appears to be a specimen which has been placed in too strong spirit, which has entirely altered its appearance, however a figure is given.

Habitat.—I have taken it at Kangra on the Himalayas and received it from Darjeeling. It is found in the Jumna for some considerable distance from the Hills, also through Burma to Moulmein. It does not appear to exceed 5 inches in length. When captured it bites most viciously, and lives for some time after its removal from the water.

Genus, 24—SISOR, *Hamilton Buchanan.*

Branchiostegals four. Gill-openings narrow and chiefly lateral, the gill-membranes being confluent with the skin of the isthmus. Head and anterior portion of the trunk broad and depressed. Eyes small. Mouth small, transverse, the upper jaw the longer. Nostrils round and approximating, but separated by a valve, they are situated midway between the eye and the end of snout. One maxillary pair of barbels with broad bases, and about five mandibular pairs. Teeth absent. A short dorsal fin destitute of a distinct spine: pectoral with a strong spine. Ventral having seven rays, and situated below the last portion of the dorsal fin. Anal with six rays. Caudal with its upper ray very prolonged. Air-vessel enclosed in a bony capsule. An axillary pore.

Geographical distribution.—Indus and upper portions of the Jumna and Ganges rivers.

SYNOPSIS OF INDIVIDUAL SPECIES.

Sisor rhabdophorus, D. $\frac{1}{6}$, A. 6. Indus, Jumna, and Ganges in their upper portions.

Sisor rhabdophorus, Plate CXV, fig. 1, 1*a*, 1*b*.

Ham. Buch. Fish. Ganges, pp. 208, 379; Bleeker, Beng. en Hind. p. 60; Gray and Hard. Ill. Ind. Zool.; Swainson, Fishes, ii, p. 305; Günther, Catal. v, p. 262.

Chennuah, Hind.: *Kir-ri-dee*, Sind.

B. iv, D. 1/6, P. 1/8, V. 7, A. 6 ($\frac{2}{4}$), C. 11.

Length of head $5\frac{1}{2}$, of caudal 11, height of body 11 in the total length excluding the caudal filament, which in some specimens equals the length of the body. *Eyes*—small, nearer the gill-opening than the end of the snout, pupil transversely oval, with an extensible muscular flap (a part of the iris) on its upper edge as in the Genus *Platycephalus* (see p. 274). Snout rather pointed. Median longitudinal groove on the head reaches the base of the occipital process. The greatest width of the head equals two-thirds of its length. Numerous rough ridges exist on the head, which is covered by very thin skin. There is a slight interspace between the end of the occipital process and the basal bone of the dorsal fin, which last has an anterior and two lateral processes covered with rough ridges. Mouth small, transverse, inferior, the upper jaw the longer. *Barbels*—the maxillary reach the pectoral spine, and are dilated at their bases. From the lower lip there is a sort of flap, having a rather long barbel at either side, which reaches the gill-opening: and two more intermediate but shorter ones: between these flaps are several short barbels on a transverse line across the chin. There are five plates on either side of the base of the dorsal fin, behind which the back has six elevated scale-like plates along the median line, the last forms a spine before the vertical from the anal fin. The last 1/2 of the body is covered by 12 osseous rings, having a superior and on either side a sharp edge as is seen in the pipe-fishes. The lateral-line has also a series of smaller but rough bony plates. *Fins*—dorsal rather higher than long, its undivided ray weak, finely serrated anteriorly. Pectoral spine compressed, not quite so long as the head, serrated on both edges, but mostly strongly so on the external one. Ventrals arise under the posterior dorsal rays. The anal commences behind the vertical from the spine on the back. Upper caudal ray with a long prolongation. *Colours*—blackish above, lighter below.

In dissecting a small specimen (the only one I could spare) no air-vessel was apparent in the abdomen, but two long bony capsules were present in the same situation as in the other fishes with an air-vessel thus enclosed, and they also probably contained them.

Habitat.—Sind, Ganges and Jumna rivers in Northern India, Bengal, and Behar, attaining 8 feet or more in length. It is not uncommon at Delhi. It is only eaten by the lowest and poorest classes. It is said to lie under stones when young.

Genus, 25—GAGATA, *Bleeker.*

Batasio,* pt. Blyth: *Callomystax*, Günther.

Branchiostegals five to seven. Gill-openings rather narrow, the gill-membranes being confluent with the skin of the isthmus. Thorax smooth. Upper surface of the head with sharp longitudinal ridges, and covered by thin skin. Eyes subcutaneous. Snout overhanging the mouth. Nostrils close together, the anterior rounded, the posterior being provided with a valve and usually with a barbel. Barbels eight, one nasal (sometimes rudimentary), one maxillary, and two mandibular pairs arising on a transverse line behind the chin, and usually with stiff bases. Villiform teeth in jaws: palate edentulous. First dorsal with one spine and six or seven rays: adipose of moderate length. Pectoral spine strong. Ventral with six rays situated posterior to the dorsal fin. Anal with a moderate (11-13) *number of rays. Caudal forked. Air-vessel in two rounded portions, each of which is enclosed in an osseous cup.*

Geographical distribution.—Rivers of Sind, India, (except Madras) and Burma.

SYNOPSIS OF SPECIES.

1. *Gagata cenia*, D. $\frac{1}{6}$, A. 14-16. Six barbels and a rudimentary nasal pair. Copper coloured, with dark blotches and banded fins in the young: dull gray, with black fins in the adult. Indus, Jumna, and Ganges rivers with their affluents, also Orissa, Assam, and Burma.
2. *Gagata itchkeea*, D. $\frac{1}{6}$, A. 12-14. Eight barbels. Copper coloured, with dark blotches. Deccan.
3. *Gagata batasio*, D. $\frac{1}{7}$, A. 16. Eight barbels. Body with two dotted stripes. Testa.
4. *Gagata tengana*, D. $\frac{1}{7}$, A. 14. Eight barbels. A dark blotch above the pectoral fin, another on the crown of the head. Dorsal and caudal dotted, edges nearly black. Assam.

1. Gagata cenia, Plate CXV, figs. 4 *(adult)*, 5 *(young)*.

Pimelodus gagata, Ham. Buch. Fish. Ganges, pp. 197, 379, pl. 39, f. 65; Bleeker, Bengal, p. 58 *(adult)*.
Pimelodus cenia, Ham. Buch. l. c. pp. 174, 376, pl. 21, f. 57; Bleeker, Beng. en Hind. p. 58 *(young)*.
Gagata typus, Bleeker, Ned. Tyds. Dierk. 1863, p. 90; Day, Proc. Zool. Soc. 1869, p. 309.
Callomystax gagata, Günther, Catal. v, p. 218.
Hemipimelodus cenia, Day, Proc. Zool. Soc. 1869, p. 308.
Jungla, Bengali: *Cenia*, Sind.: *Nga-nan-joung*, Burmese.

B. v-vi, D. $\frac{1}{6}$/0, P. $\frac{1}{9}$, V. 6, A. 14-16 ($\frac{3-4}{11-12}$), C. 19.

Length of head $4\frac{1}{2}$ to 5, of caudal $4\frac{1}{2}$ to 5, height of body 5 to 7 in the total length. *Eyes*—diameter 4 to $4\frac{1}{4}$ in the length of head (3 in the young), 1 to $1\frac{1}{2}$ diameters from the end of snout, and 1 apart. Head 1/4 higher than wide: snout somewhat compressed, overhanging the mouth. The median longitudinal groove on the head deep, and extends to the posterior end of the occipital process, which is narrow and almost touches the basal bone of the dorsal fin. *Barbels*—nasal rudimentary: the maxillary pair reach to the base of the pectoral spine, or a little more: the two mandibular pairs arise on a transverse line across the chin, the outer are half as long as the head. *Fins*—the dorsal higher than the body, its two first rays being the longest, spine moderately strong, as long as, to 1/4 longer than, the head:† it is serrated anteriorly in its upper fourth in the young. Pectoral reaches to above the ventral, its spine is stronger, longer or shorter than that of the dorsal, it is strongly denticulated internally, serrated externally in its outer fourth. Base of the adipose dorsal as long as that of the rayed fin. *Air-vessel*—in two lateral portions, enclosed in bony capsules. *Colours*—dull gray, the outer two-thirds of the pectoral, the outer halves of both dorsals, ventral and anal black: caudal whitish. The *young* are of a yellowish bronze colour, becoming silvery on the abdomen: they have three dark bands over the head, and four more over the back, descending as low as the lateral-line. Caudal with a semilunar black band, or a black blotch on each lobe: a dark mark across the dorsal fin.

Some small fry from Darjeeling show the lower half of the front surface of the dorsal spine rough.

Habitat.—Rivers of Bengal and Orissa, the Jumna, Ganges, and Indus, also Burma. It attains a foot in length. The specimen (fig. 4) was from Calcutta, where it is very common, (fig. 5) is from a Delhi example.

2. Gagata itchkeea, Plate CXV, fig. 6.

Phractocephalus itchkeea, Sykes, Trans. Zool. Soc. ii, p. 373, t. 67, f. 1.
Bagrus itchkeea, Bleeker, Beng. p. 56.
Pimelodus itchkeea, Jerdon, M. J. L. and Science, 1849, p. 341.

* Genus *Batasio*, Blyth, is said to comprise fishes with the barbels shorter than the head and teeth on the palate, examples: *Pimelodus batasio*, H. B. (the author merely says of the teeth, that those "in both jaws are crowded"), *P. tengana*, H. B. *B. affinis*, Blyth, *P. chandramara*, H. B. and *P. rama*, H. B. The two first probably belong to Genus *Gagata*, the third to *Macrones*, and the last two to *Liocassis*.

† This alteration with age is very well shown in a series of these fishes, specimens from 2 to 3 inches long have the dorsal spine from 7 to $7\frac{1}{4}$ in the total length: from 3 to 4 inches the spine is 6 to 7: from 4 to 5 inches the spine is 5 to $5\frac{1}{2}$ times: from 5 to 6 inches the spine is 5 to $5\frac{1}{2}$ times.

Macrones itchkeea, Günther, Catal. v, p. 84.
Hemipimelodus itchkeea, Day, Journ. Linn. Soc. Zool. xii, p. 571.

D. $\frac{1}{6}$ | 0, P. 1/8, V. 6, A. 12-14 ($\frac{3-4}{9-10}$), C. 19.

Length of head 5, of caudal $4\frac{1}{2}$, height of body 6 in the total length. *Eyes*—diameter 3 in the length of head, 1 diameter from the end of snout, and also apart. Snout overhanging the mouth. Median longitudinal groove on the head reaching to the base of the occipital process: a lateral process proceeds from the occiput, curving rather outwards and downwards: the process at the shoulder pointed, and as long as the head excluding the snout. *Barbels*—the nasal reach to the front third of the eye, the maxillary to the middle of the pectoral spine, whilst the two mandibular pairs (which arise on a transverse line behind the lower lip) are longer than the head. *Teeth*—villiform in jaws: none on the palate. *Fins*—dorsal spine smooth, as long as the head posterior to the nostrils: pectoral spine equally long and denticulated internally. *Air-vessel*—in a lobe on either side, bounded superiorly and partly laterally by the auditory ossicles. *Colours*—yellowish-bronze, becoming silvery on the sides and abdomen: some dark blotches along the back descending to half way down the sides. A black blotch on either lobe of the caudal, and another on the dorsal fin.

Habitat.—Rivers of the Deccan, it appears to be a small species. The one figured (from Poona) was the largest obtained.

3. Gagata batasio, Plate XCIX, fig. 5.

Pimelodus batasio, Ham. Buch. Fish. Ganges, pp. 179, 377.
Bagrus batasio, Cuv. and Val. xiv, p. 425; Bleeker, Beng. p. 56.
Batasio Buchanani, Blyth. P. A. S. of Beng. 1860, p. 150.
Macrones batasio, Günther, Catal. v, p. 83.

D. $\frac{1}{7}$ | 0, P. 1/?, V. 6, A. 16, C. 20.

Head small, as is also the mouth. *Eyes*—small, and high up. *Barbels*—eight, shorter than the head. *Fins*—dorsal spine strong, entire: pectoral spine strong and serrated internally: caudal lobed, *Colours*—body diaphanous, having along either side two stripes spotted with black.

Judging from the mandibular barbels and general structure of this fish, it would appear to be a *Gagata*, whilst it is observed "there is no *slit* under the throat."

Habitat.—River Testa, attaining 3 inches in length. The figure is reproduced from H. B.'s manuscript drawings at Calcutta, and the description from his work.

4. Gagata tengana.

Pimelodus tengana, Ham. Buch. Fish. Ganges, pp. 176, 377, pl. 39, f. 58.
Bagrus tengana, Cuv. and Val. xiv, p. 453; Bleeker, Beng. p. 56.
Batasio tengana, Blyth, P. A. S. of Bengal, 1860, p. 150.
Macrones tengana, Günther, Catal. v, p. 84.

B. vi, D. $\frac{1}{7}$/0, P. 1/8, V. 6, A. 14 ($\frac{4}{10}$), C. 15.

Length of head 4, of caudal 4, and height of body 4 in the total length. *Eyes*—of moderate size, situated nearer the snout than to the posterior end of the opercle. Back rather prominent. Width of the head equals its height, or its length excluding the snout. Mouth small, upper jaw slightly the longer. Median longitudinal groove on the head lanceolate and extending to the base of the occipital process which is twice as long as wide at its base, and reaches the basal bone of the dorsal fin. *Barbels*—the nasal reach the hind edge of the orbit, and all the remainder are shorter than the head. *Fins*—the first dorsal cut obliquely, its spine smooth. Pectoral spine serrated internally. *Colours*—body diaphanous, having a gloss of gold on the sides. On the back are many black dots which are collected into a blotch above the pectoral fin, and another exists on the crown of the head. Dorsal and caudal fins dotted, edges nearly black.

This fish, which is found in Assam, agrees with *G. cenia* except that the nasal barbels are described and shown as being much longer, and the colour differs.

Habitat.—Brahmaputra river to about 3 inches in length.

Genus, 25*a*—Nangra.

Branchiostegals five or six. Gill-openings rather wide, and not or only slightly adherent to the skin of the isthmus. Thorax smooth. Upper surface of the head with sharp longitudinal ridges and covered by thin skin. Eyes subcutaneous. Snout overhanging the mouth which is transverse. Nostrils close together, the anterior rounded, the posterior with a barbel. Barbels eight, one nasal (which may be rudimentary), one maxillary and two mandibular pairs, the inner of which last are anterior to the external pair. Villiform teeth in jaws, palate edentulous. First dorsal fin with one spine and six to eight rays: adipose of moderate length. A pectoral spine. Ventral with six rays situated posterior to the dorsal. Anal with a moderate number of rays (10-12). *Caudal forked. Air-vessel in two rounded portions each of which is enclosed in bone.*

Geographical distribution.—Small fishes found in the Indus, Jumna, Ganges, and Bengal rivers.

This genus differs from *Gagata* in its barbels not being placed in a transverse line behind the chin: and

in its gill-membranes not being confluent with a broad isthmus but rather deeply notched. It is allied in some respects to *Macrones*, but has no teeth on the palate, whilst its air-vessel is enclosed in bone.

SYNOPSIS OF SPECIES.

1. *Nangra Buchanani*, D. $\frac{1}{8}$, A. 10-11. Muddy colour. Indus, Ganges and Jumna river.
2. *Nangra punctata*, D. $\frac{1}{6}$, A. 11-12. Coppery, glossed with gold and having black blotches. Sone river at Bheer Bhoom.
3. *Nangra viridescens*, D. $\frac{1}{6}$, A. 11. Two greenish bands descend from the back. Northern Bengal and the Deccan.

1. Nangra Buchanani, Plate CXIII, fig. 3.

Pimelodus nangra, Ham. Buch. Fish. Ganges, pp. 193, 378, pl. xi, f. 63 ; Bleeker, Beng. p. 58.
Macrones nangra, Day, Proc. Zool. Soc. 1871, p. 288.

D. $\frac{1}{8}$/0, P. 1/9, V. 6, A. 10-11 ($\frac{2-3}{8-9}$), C. 17.

Length of head and caudal fin from $4\frac{1}{2}$ to 5, height of body 6 in the total length. *Eyes*—rather high up, in the anterior half of the head and covered with skin, $1\frac{1}{4}$ diameters from end of snout. The greatest width of the head equals its length excluding the snout. Upper jaw considerably the longer, snout rather depressed, mouth wide. Median longitudinal groove deep, extending to the occipital process up which it is continued, the occipital process 3 times longer than wide at its base and extending to the basal bone of the dorsal fin. *Barbels*—the nasal longer than the head, the maxillary reach the vent, or even end of anal fin, external mandibular the base of the ventral, and the internal (which arise in front and to inner edge of the external ones) the base of the pectoral. *Teeth*—none on the palate. *Fins*—dorsal spine weak and entire, half as long as the head in the very young, longer in larger specimens: the length of the base of the adipose dorsal equals that of the anal, or the interspace between its commencement and the end of the base of the rayed fin: pectoral spine moderately strong, with nine coarse denticulations internally, it is as long as the head without the snout: caudal deeply forked, lobes of equal length and pointed. *Air-vessel*—in two oval portions, each of which is enclosed in a thin bony capsule which has a round orifice on the outer side. *Colours*—muddy, with three indistinct vertical greenish half bands.

Habitat.—Ganges, Jumna, and Indus, attaining two inches in length. The specimen figured was from Delhi.

2. Nangra punctata, Plate CXV. fig. 8.

B. v, D. $\frac{1}{6}$/0, P. 1/8, V. 6, A. 11-12 ($\frac{3-4}{8}$), C. 18.

Length of head 4, of caudal $5\frac{1}{4}$, height of body $6\frac{1}{4}$ in the total length. *Eyes*—diameter $4\frac{1}{2}$ in the length of head, $1\frac{1}{2}$ diameters from the end of snout, and $1\frac{1}{4}$ apart. The greatest width of the head equals its length behind the angle of the mouth. Snout compressed, overhanging the mouth, which latter is transverse. Gill-openings rather wide, the skin not confluent with that of the isthmus. The median longitudinal groove on the head deep, with raised sides, extending to the base of occipital process, which is four times as long as wide, and almost reaches the basal bone. Osseous processes from back of skull and above base of pectoral fin well developed. *Barbels*—the maxillary reach the base of the pectoral spine: the mandibular ones are shorter than the head, the internal pair placed anterior to the external pair. The nasal pair are rudimentary or wanting. *Teeth*—those in the upper jaw placed anterior to the lower jaw. *Fins*—dorsal spine strong, smooth, half as long as the head. Pectoral spine very strong, as long as the head behind the angle of the mouth, and with about 12 denticulations internally; it is roughened in its lower half externally. *Colours*—coppery, glossed with gold on the sides: a black blotch on occiput, and three or four along the back descending half way down the sides. A black band on dorsal, and some black markings on the caudal.

This fish in appearance is very similar to the young of *Gagata cenia*, but may be at once recognized by the position of the barbels, and broader head.

Habitat.—I captured two specimens of the same size in the Sone river at Bheer Bhoom, in Bengal.

3. Nangra viridescens, Plate CXV, fig. 7.

Pimelodus viridescens, Ham. Buch. Fish. Ganges, pp. 173, 376, pl. xi, f. 56; Bleeker, Bengal, p. 58.
Huddah, Hind.

D. $\frac{1}{6}$/0, P. 1/8, V. 6, A. 11 ($\frac{2}{9}$), C. 21.

Length of head 4 to $4\frac{1}{4}$, of caudal 5, height of body 6 in the total length. *Eyes*—diameter 4 in the length of the head, $1\frac{1}{4}$ diameters from the end of snout, and 1 apart. The greatest width of the head equals its length behind the angle of the mouth. Snout overhanging the mouth, which is transverse. Gill-openings wide, the membranes being notched. Median longitudinal groove on the head deep, having raised edges, and reaching the base of the occipital process, which latter is three times as long as wide, and does not quite reach the basal bone. Osseous processes from occiput and over base of pectoral fin well developed. *Barbels*—the maxillary reach the root of the pectoral spine: the two inner mandibular ones are anterior to the external pair. *Teeth*—none on the palate. *Fins*—dorsal spine strong, smooth, and half as long as the head. Pectoral spine strong,

externally rough in its lower half, denticulated internally. *Colours*—glossy greenish-brown on the back, with two very light green bands passing one from the base of either dorsal fin to the middle of the depth of the body. A dark band on the dorsal fin and spots on either lobe of the caudal.

Habitat.—Rivers of Northern Bengal, not uncommon in the Jumna at Delhi, and also found at Poona in the Deccan.

Genus, 26—Bagarius, *Bleeker.*

Branchiostegals twelve. Gill-membranes not confluent with the skin of the isthmus, having a free posterior edge and notched half way to the chin. Head depressed, its upper surface osseous. Mouth anterior: upper jaw the longer. Eyes with free orbital margins. Nostrils approximating, the posterior provided with a barbel. Barbels eight, one nasal, one maxillary, and two mandibular pairs. Teeth in jaws pointed, and of unequal sizes: palate edentulous. Thorax destitute of any adhesive apparatus. First dorsal fin in advance of the ventrals, having one spine and six rays: adipose fin present. Ventral with six rays. Anal of moderate length. Caudal deeply forked. Air-vessel small, consisting of two rounded portions enclosed in bone. An axillary pore.

The air- or swim-bladder of this fish is present, but small. Taylor (*Gleanings in Science*, June 1830) remarks that the *Bagarius Yarrellii* "has also two air-bladders, which closely resemble the former (*Saccobranchus fossilis*, &c.) in the argentine tendinous texture of the external coat, and in having no communication with each other, or with the alimentary canal. They are situated one on each side of the body, in a deep groove or furrow of the consolidated transverse processes of the cervical vertebræ, and are extremely small in proportion to the bulk of the fish; each of them in an individual weighing 10 lbs., not exceeding a large garden pea in size: they are placed in the middle of the grooves at about an equal distance from the common integument (immediately behind the pectoral fin) and the vertebral column: the space between each of them, and the former, being filled up with adipose substance, whilst that next to the spine is occupied by the *Malleus*."

Geographical distribution.—Throughout the course of the larger rivers of the Punjab, India, and Burma, and extending to the Malay Archipelago.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Bagarius Yarrellii*, D. $\frac{1}{6}$, A. 13-15. Gray, banded and clouded with black. India to the Malay Archipelago.

1. Bagarius Yarrellii, Plate CXV, fig. 3.

Pimelodus bagarius, Ham. Buch. Fish. Ganges, pp. 186, 378, pl. 7, f. 62; Cuv. and Val. xv, p. 146, pl. 433; Bleeker, Silur. Bat. p. 10.

Bagrus Yarrellii, Sykes, Trans. Zool. Soc. ii, p. 370, t. 65, f. 1; Bleeker, Beng. p. 56.

Pimelodus platespogon, Val. in Jacq. Voy. Ind. Ori. pl. 18, f. 3; Bleeker, Beng. p. 58.

Pachypterus luridus, Swainson, Fishes, ii, p. 306.

Pimelodus Carnaticus, Jerdon, M. J. L. and S. 1849, p. 341 *(young)*.

Bagarius Buchanani, Bleeker, Beng. en Hind. pp. 58, 121, Prod. Silur. p. 212, and Atl. Ich. Silur. p. 61, t. 81.

Pimelodus Yarrellii, Jerdon, M. J. L. and S. 1849, p. 341.

Bagarius Yarrellii, Günther, Catal. v, p. 183.

Boonch or *Goonch*, Hind. (N. W. P): *Goreah*, Assam: *Rahti jellah*, Tel.: *Sah-lun*, Ooriah.

B. xii, D $\frac{1}{6}$/0, P. 1/12, V. 6, A. 13-15 ($\frac{3}{10-12}$), C. 17.

Length of head $3\frac{3}{4}$, of caudal $4\frac{1}{4}$, height of body 5 in the total length excluding the prolonged caudal ray. *Eyes*—small, situated in the middle of the length of the head. The greatest width of the head equals from 2/3 of its length in the young to its entire length in the adult, its upper surface is rugose in irregular bands and lines. Upper jaw the longer, the extent of the gape of the mouth equal to 4/7 of the length of the head. *Barbels*—the maxillary with broad bases and rather longer than the head: the nasal pair short. *Teeth*—sharp, and of unequal sizes in the jaws, an outer widely separated row of larger ones in the mandibles. *Fins*—dorsal spine smooth, with an elongated soft termination, the osseous portion as long as the head excluding the snout: length of the base of the adipose dorsal as long as that of the rayed fin. Pectoral spine stronger, and as long as that of the dorsal, serrated internally, and having a soft prolongation. Caudal deeply forked, its upper lobe prolonged. *Skin*—somewhat scabrous over the summit of the head, and slightly so on the body. *Colours*—body gray or yellowish, with large, irregular, brown or black markings and cross bands. A black base to all the fins, and generally also a dark band.

This fish takes a live-bait, but is difficult to kill, it is sluggish, goes to the bottom, and it generally escapes by destroying the tackle. Mr. Van Cortland, at the end of 1875, angling at the Okla weir, a few miles below Delhi, killed one which was 5 feet long and weighed 136 lbs.

Habitat.—Large rivers of India and Java, descending to the estuaries. It attains 6 feet or more in length, and is often termed a "fresh-water shark," partly due to its voracity, and partly to its underhung mouth and general ugliness.

Genus, 27—Glyptosternum, *McClelland.*

Glyptothorax, Blyth.

Branchiostegals from six to about ten. Gill-openings rather wide, gill-membranes confluent with the skin of the isthmus. Head rather depressed and covered with soft skin. Eyes small, subcutaneous. Mouth inferior, transverse, with the upper jaw the longer. Nostrils close together, separated by a barbel. Barbels eight, one nasal, one maxillary, and two mandibular pairs, the maxillary ones with broad bases. Villiform teeth in the jaws: palate edentulous. Dorsal fin with a spine and six or seven rays: an adipose fin present. Pectoral horizontal, with a strong spine, some of its rays being occasionally plaited inferiorly, and an adhesive apparatus exists between the bases of the two pectoral fins on the chest, composed of longitudinal plaits. Ventral with six rays, situated posterior to the dorsal. Anal with a moderate (9-12) *number of rays. Caudal forked. Air-vessel, when present,* in two lateral portions more or less enclosed in bone.*

Blyth instituted *Glyptothorax* for those species having a spine to the dorsal fin, as McClelland in his definition of his Genus observed "spines when present are concealed within the membrane of the fins," and gave as his type *Glyptosternum reticulatus*, observing "without spines."

Geographical distribution.—These fishes are found along the Himalayas and rivers at their bases from Afghanistan to the extreme east of Assam, also in the Malay Archipelago. They are also present in some rivers in the plains of India, but usually not far removed from hills. They appear especially adapted for strong streams and those of hilly districts.

It is certainly open to question whether some of the following might not more properly be termed varieties than species. Roughness of the external edge of the pectoral spine may certainly exist in species in which it is normally smooth.

SYNOPSIS OF SPECIES.

1. *Glyptosternum lonah*, A. 11-13. Length of head 5 to $5\frac{1}{4}$ in the total. Maxillary barbels reach pectoral fin. Pectoral spine rough or smooth externally. Dorsal spine smooth. Brown, with black marks. Jumna and the Deccan.

2. *Glyptosternum trilineatum*, A. 13. Length of head 6 in the total. Maxillary barbels reach the pectoral fin. Chestnut-brown, with two light longitudinal bands. Nepal and Burma.

3. *Glyptosternum conirostre*, A. 11-12. Width of head 2/3 of its length. Adhesive apparatus rather elongated and narrow. Maxillary barbels reach middle of pectoral fin. Himalayas from Kangra and Simla.

4. *Glyptosternum botia*, A. 11-12. Pupil of eyes transversely oval. Maxillary barbels reach to below the hind edge of the eye. Skin roughened with small spinate tuberosities. Jumna and rivers of Northern Bengal.

5. *Glyptosternum telchitta*, A. 11. Pupil of eyes circular. Maxillary barbels reach to below the hind edge of eyes. Skin looks as if it had scales imbedded in it. Punjab, N. W. Provinces, Bengal, and Behar.

6. *Glyptosternum striatum*, A. 11. Head $4\frac{3}{4}$ in the total length. Maxillary barbels reach first third of the pectorals. Khasya hills.

7. *Glyptosternum Madraspatanum*, A. 10-11. Maxillary barbels reach base of pectoral fin. Dorsal spine with serrations on both edges. Bowany river, Madras.

8. *Glyptosternum pectinopterum*, A. 9-11. Width of head nearly equals its length. Maxillary barbel reaches base of pectoral spine. Adhesive apparatus wider than long. Himalayas to Simla and Darjeeling.

9. *Glyptosternum cavia*, A. 9. Upper surface of head with elevated spots. Maxillary barbels as long as the head. Ramghur district of Bengal.

1. Glyptosternum lonah, Plate CXIII, fig. 5.

Bagrus lonah, Sykes, Trans. Zool. Soc. ii, p. 371.
Glyptosternum lonah, Günther, Catal. v, p. 187.
Glyptosternum Dekkanense, Günther, Catal. v, p. 187.

D. $\frac{1}{6}$/0, P. 1/9, V. 6, A. 11-13 ($\frac{3-4}{8-10}$), C. 15-17.

Length of head 5 to $5\frac{1}{4}$, of caudal 5, height of body 7 in the total length. *Eyes*—slightly behind the middle of the length of the head, the width of the interorbital space equals 1/3 to 2/7 of the length of the head. Width of head nearly or quite equals its length: upper surface rough. Width of gape of mouth equals $2\frac{1}{2}$ to 3 in the length of the head. Lips not fringed. Occipital process nearly or quite four times as long as broad. *Barbels*—the nasal reach half way to the orbit, the maxillary extend to the base or first third of the pectoral, the outer mandibular pair to the gill-opening, whilst the inner are shorter. *Fins*—dorsal higher than the body, its spine rather slender, enveloped in skin, $1\frac{3}{4}$ to $2\frac{1}{4}$ in the length of the head: adipose dorsal with its base longer than that of the first dorsal, and equal to half the interspace between the two fins. Pectoral spine moderately broad, internally strongly denticulated, externally roughened in some specimens, smooth in others, the fin does not nearly reach the ventral. Caudal forked. *Caudal peduncle*—twice as long as high in the young, two-thirds

* In *G. Madraspatanum* I have been unable to find an air-vessel.

in the adult. *Colours*—yellowish-brown, banded with blackish: fins yellow: dorsal, caudal and anal with black bands.

Thoracic adhesive apparatus rather elongated, reaching to the first third of the pectoral spine, its plaits are scarcely branched.

Habitat.—Deccan, attaining at least 6 inches in length. I have taken this species at Poona, and also in the head waters of the Jumna.

2. Glyptosternum trilineatum, Plate CXVI, fig. 3.

Glyptothorax trilineatus, Blyth, P. A. S. of Beng. 1860, p. 154.
Glyptosternum trilineatum, Günther, Catal. v, p. 185.

D. $\frac{1}{6}$/0, P. $\frac{1}{10}$, V. 6, A. 13 ($\frac{3}{10}$), C. 19.

Length of head 6, of caudal $5\frac{1}{2}$, height of body 6 in the total length. *Eyes*—small, behind or in the middle of the length of the head. Head about as long as broad and covered with soft skin, snout obtuse. Lips not fringed. Occipital process nearly three times as long as broad. *Barbels*—the maxillary reach to the end of the head: nasal barbels nearly to the orbit: the external mandibular pair longer than the internal, and reaching to the base of the pectoral fin. Thoracic adhesive apparatus rather large, *Teeth*—villiform in the jaws, none on the palate. *Fins*—dorsal fin as high as the body, its spine weak, slightly serrated posteriorly, and its bony portion rather above half the length of the head: adipose dorsal of moderate height, its base being equal to more than that of the first dorsal, and to about half of the distance between the two fins. Pectoral spine rather broad, denticulated internally, smooth externally, reaching two-thirds of the distance to the base of the ventral. Caudal deeply forked. Skin smooth. *Caudal peduncle*—twice as long as high. *Colours*—chestnut-brown, with a light streak along the back, another along the lateral-line, and a third near the abdominal margin.

G. gracile, Günther, v, p. 186, from Nepaul differs in having one more anal ray: occipital process a little narrower: maxillary barbels longer, whilst the pectoral fin reaches the base of the ventral.

The drawing was made from one in the Calcutta Museum taken in Rangoon in 1869.

Habitat.—Burma, Tenasserim and Nepaul. It attains 12 inches or more in length.

3. Glyptosternum conirostre, Plate CXVI. fig. 5.

Steindachner, Verh. z. b. Ges. Wien, 1867, p. 16, t. v and vi, figs. 2.

D. $\frac{1}{6}$ | 0, P. 1/9, V. 6, A. 11-12 ($\frac{2}{9-10}$), C. 17.

Length of head $5\frac{1}{4}$, of caudal $5\frac{1}{2}$, height of body $5\frac{1}{2}$ in the total length. *Eyes*—slightly behind the middle of the length of the head, the width of the interorbital space equals 1/4 of the length of the head. The width of the head equals 2/3 of its length. Upper jaw the longer: the width of the gape of the mouth equals 1/2 of the length of the head. Lips not fringed. Occipital process three times as long as wide. *Barbels*—the maxillary have broad bases and extend to the middle of the pectoral fin: the nasal, which have a very wide fringe, reach the hind edge of the eye: the outer mandibular, which is also broad, to the gill-opening: whilst the inner are shorter. *Teeth*—generic. *Fins*—dorsal as high or rather higher than the body, its spine strong, as long as the head behind the nostrils and smooth, serrated posteriorly in some specimens: length of the base of the adipose dorsal exceeds that of the rayed fin, and equals two-thirds of the extent of the interspace between the two fins. Pectoral reaches nearly to the ventral, its spine strong, as long as that of the dorsal, and having about 13 denticulations internally, it is not striated inferiorly. Ventral does not quite reach the anal. Caudal forked. Adhesive apparatus in the chest rather broad, but posteriorly a large circular smooth space causes it to be semicircular. Caudal peduncle about as high at its base as it is long. *Colours*—brownish, fins yellow, stained with black.

This fish has a considerable similarity to *G. pectinopterum*, but possesses a wider mouth, a narrower head, broader barbels, a higher caudal peduncle, and a more elongated adhesive apparatus.

Habitat.—Himalayan streams, the one figured was from Simla. Specimens from Kangra have the pectoral spine serrated externally.

4. Glyptosternum botia, Plate CXIII, fig. 4.

Pimelodus botius, Ham. Buch. Fish. Ganges, pp. 192, 378; Bleeker, Beng. en Hind. p. 59.

B. vi, D. $\frac{1}{6}$/0, P. 1/8, V. 6, A. 11-12 ($\frac{2}{9-10}$), C. 18.

Length of head $5\frac{1}{2}$, of caudal $4\frac{1}{2}$, height of body $6\frac{1}{2}$ in the total length. *Eyes*—pupils transversely oval, small, situated in the commencement of the front half of the head: the width of the interorbital space, which is convex, equal to 1/3 of the length of the head. The greatest width of the head equals its length excluding the snout. Upper jaw the longer: the width of the mouth equals 1/3 of the length of the head. *Barbels*—eight, the maxillary reach to below the hind edge of the eyes, the nasal half way to the orbits, the mandibular pairs are short. *Teeth*—villiform in the jaws. *Fins*—dorsal spine smooth, as long as the head excluding the snout: length of the base of the adipose fin equalling one-third of that of the interspace between the two fins. Pectoral reaches two-thirds of the distance to the ventral, its spine is strong, as long as the head excluding the snout, and with about 20 strong teeth internally. Ventral reaches the anal. Caudal deeply

lobed, lobes of equal length. Adhesive apparatus well-marked. *Skin*—roughened with small spinate tuberosities arranged in longitudinal rows all over the body. Free portion of the tail twice as long as high at its base. *Colours*—brownish, intermixed with yellow, and blotched with blackish. Fins yellow with black marks and spots.

This fish very closely resembles *G. telchitta*, but has a more roughened skin, whilst the profile of the eye is transversely oval. Hamilton Buchanan (MSS.) observes of this species in the Rangpur district, "the *Bhot Mágur* of the Dharká if possible is still uglier (than the *Erethistes conta*). The people of Bhutan are said to be remarkably fond of it from whence its name is derived. The people of Behar will not eat it."

Habitat.—The specimen figured (life size) was from the Jumna. It is common at Delhi. Hamilton Buchanan observed that it was from the northern rivers of Bengal, and attains 6 inches in length.

5. Glyptosternum telchitta, Plate CXVI, fig. 2.

Pimelodus telchitta, Ham. Buch. Fish. Ganges, pp. 185, 378; Bleeker, Beng. p. 58.
Glyptosternum telchitta, Day, Proc. Zool. Soc. 1871, p. 288.
Gooacherah, Beng.; *Telliah*, Hind. (N. W. P.)

B. vi, D. $\frac{1}{6}$/0, P. 1/8, V. 6, A. 11 ($\frac{2}{9}$), C. 17.

Length of head $5\frac{1}{2}$ to $5\frac{3}{4}$, of caudal $5\frac{3}{4}$, height of body $7\frac{1}{2}$ to 8 in the total length. *Eyes*—small, with a circular profile, situated in the middle of the length or in the commencement of the posterior half of the head: interorbital space flat, its width $3\frac{1}{2}$ to 4 in the length of the head. The greatest width of the head equals 3/4 of its length. Upper jaw the longer, the width of the gape of the mouth equals 1/3 of the length of the head: lips not fringed. Opercle ends posteriorly in an elongated pointed termination: occipital process three times as long as wide at its base. *Barbels*—the nasal very short, the maxillary ones reach to rather behind the posterior edge of the orbit: the outer mandibular pair reach the gill-opening, the internal are shorter. *Teeth*—generic. *Fins*—dorsal nearly as high as the body, its spine which is 4/7 as long as the head, has a soft continuation, it is slightly enveloped in skin and entire: adipose dorsal of moderate height, the extent of its base equalling that of the rayed fin, or 1/2 of that of the interspace between the two fins. Pectoral spine broad, reaching 2/3 of the distance to the base of the ventral, smooth externally, from 13 to 14 teeth internally, and not plaited below. Caudal deeply forked. Thoracic adhesive apparatus rather large, its plaits nearly longitudinal. Skin everwhere covered with small longitudinal elevations like scales imbedded in it. Free portion of the tail twice as long as high at its base. *Colours*—blackish-brown, fins yellow with black bands: caudal blackish, with a yellow edge. *Air-vessel*—in two rounded lateral portions enclosed in bone.

Habitat.—Punjab, N. W. Provinces, Bengal, and Behar. It attains 5 or 6 inches in length.

6. Glyptosternum striatum.

McClelland, Cal. Journ. Nat. Hist. ii, p. 587: Bleeker, Beng. en Hind. p. 58: Günther, Catal. v, p. 188.

B. vi, D. $\frac{1}{6}$ | 0, P. 1/11, V. 6, A. 11 ($\frac{2}{9}$), C. 15.

Length of head $4\frac{3}{4}$, of caudal 5, height of body 6 in the total length. *Eyes*—situated in about the middle of the length of the head, the width of the interorbital space equal to one-third of the length of the head. Head nearly as broad as long. Upper jaw the longer, the width of the gape of the mouth equals half the length of the head. Lips not fringed. Occipital process three times as long as wide at its base. *Barbels*—the maxillary reach beyond the base of the pectoral fin. *Fins*—dorsal higher than the body, its spine slender, 1/2 as long as the head and enveloped in skin: length of the base of the adipose dorsal 2/3 of that of the interspace between the two fins. Pectoral spine much stronger than that of the dorsal, with about 20 fine denticulations internally and striated along its under surface. Free portion of the tail twice as long as high at its base. *Colours*—uniform brown.

Glyptosternum reticulatus, McClelland, from Afghanistan (Cal. Journ. Nat. Hist.) is said to be closely allied to this species, but to be *without spines*, and is probably an *Exostoma*.

Habitat.—Khasya hills in Assam, attaining at least $8\frac{1}{2}$ inches in length.

7. Glyptosternum Madraspatanum, Plate CXVI, fig. 4.

Day, Journal Linnean Society, xi, p. 526.

B. vi, D. $\frac{1}{6}$/0, P. 1/10, V. 6, A. 10-11 ($\frac{2-3}{8-9}$), C. 17.

Length of head 5 to $5\frac{1}{4}$, of caudal $4\frac{1}{3}$ to $4\frac{2}{3}$, height of body $6\frac{1}{2}$ in the total length. *Eyes*—small, situated in the middle or the commencement of the posterior half of the head, the distance between the eyes equals 2/7 of the length of the head. The greatest width of the head equals its length behind the front nostrils. Upper surface of the head rather rough, upper jaw the longer: the width of the mouth equals 2/5 of the length of the head: lips not fringed. Occipital process very narrow, four times as long as wide at its base. *Barbels*—the maxillary reach the base of the pectoral, the nasal 2/3 to 3/4 of the distance to the orbit: the outer mandibular ones to the gill-openings, whilst the internal are a little shorter. *Teeth*—generic. *Fins*—dorsal spine rather strong, not enveloped in skin, serrated posteriorly, and in some specimens anteriorly in its upper third, it is as long as the head behind the angle of the mouth: base of adipose rather longer than that of the

rayed dorsal fin. Pectoral almost reaches the ventral, its spine not plaited, moderately strong and 3/4 as long as the head. *Caudal peduncle*—half as high as long. Skin smooth. *Colours*—yellowish, with dark bands: fins also yellow, with black bands. *Air-vessel*—apparently absent.

This species is nearly allied to *G. lonah*, but amongst other differences its dorsal spine appears to be always toothed, whereas in all specimens of *G. lonah* that I have seen it is entire.

This species is nearly allied to *G. trilineatum*, but has a longer head and less anal rays.

Habitat.—Bowany river at the foot of the Neilgherry hills, where I obtained 16 specimens up to 5 inches in length.

8. Glyptosternum pectinopterum, Plate CXVI, fig 6.

McClelland, Cal. Journ. Nat. Hist. ii, p. 587; Bleeker, Beng. en Hind. p. 58; Günther, Catal. v, p. 188.

Glyptosternum Stoliczkæ, Steind. Verh. z. b. Ges. Wien, 1867, p. 17, t. v and vi, f. 1.

Glyptosternum modestum, Day, Proc. Zool. Soc. 1871, p. 714.

Juppah, Punj. (at Chumba): *Nung-grare*, Punj. at Beeas if small, *Kuggar*, if large: *No-woo*, Punj. at Kangra.

B. x, D. $\frac{1}{6}$/0, P. 1/8-9, V. 6, A. 9-11 ($\frac{1-2}{6-9}$), C. 17, Vert. 15-17.

Length of head $4\frac{3}{4}$ to $5\frac{1}{4}$, of caudal $5\frac{1}{2}$ to 6, height of body 6 in the total length. *Eyes*—in the middle of the length of the head, the width of the interorbital space equals $3\frac{3}{4}$ in the length of the head. The width of the head nearly or quite equals its length. Upper jaw the longer, the width of the gape of the mouth $2\frac{3}{4}$ to 3 in the length of the head. Lips not fringed. Occipital process three times as long as wide at its base. *Barbels*—the maxillary extend nearly to the middle of the pectoral fin: the nasal reach the orbit: the outer mandibular to the base of the pectoral, whilst the inner are rather shorter. *Teeth*—generic. *Fins*—dorsal nearly as high as the body, its spine rather slender, and more than 1/2 as long as the head: in many specimens up to three or four inches in length the soft termination of the spine is continuous with it, and on bending it appears as if there were numerous points anteriorly, this appearance is usually lost in the adult fish: base of the adipose dorsal rather longer than that of the rayed fin and equal to 4/5 of the interspace between the two fins. Pectoral extends three-fifths of the distance to the ventral, its spine is flattened, strong, and as long as the head excluding the snout, and having coarse denticulations internally. The outer rays of the ventral and pectoral are plaited inferiorly, this appearance is usually lost in specimens preserved in spirit unless the alcohol was very strong at the commencement. *Caudal peduncle*—one-third to twice as long as high at its base. Adhesive apparatus well marked. *Colours*—uniform brown, with a yellowish mark along the back, fins yellow, stained with black. *Air-vessel*—in two lateral portions, partially enclosed in bony capsules formed by a trumpet-shaped process from the anterior vertebra.

G. modestum appears to be the young, it is much wider in the body and the peculiar appearance shown in the termination of the dorsal spine of moderately sized specimens is scarcely perceptible.

Habitat.—Himalayas through the Punjab, and at Kangra, Simla, Darjeeling.

9. Glyptosternum cavia.

Pimelodus cavia, Ham. Buch. Fish. Ganges, pp. 188, 378.

Bagarius ? cavia, Bleeker, Beng. en Hind. p. 58.

Kanya tenggara, Hind.

D. $\frac{1}{6}$/0, P. $\frac{1}{8}$, V. 6, A. 9 (3/6), C. 17.

"It is flattened before, conical behind, and all its upper parts are scabrous from elevated spots." "Head very large, a good deal flattened, blunt, and covered above with bony plates, forming various ridges." Upper jaw the longer. *Barbels*—nasal very short, the maxillary as long as the head, the two pairs of mandibular ones shorter. *Teeth*—none on the palate. *Fins*—dorsal spine blunt, rough, but not serrated on the anterior surface: adipose fin small and rough: pectoral spine serrated on both edges: lower caudal lobe the longer. *Colours*—"lurid, and the back is variegated with brown dots, collected into cloud-like marks, while the sides have a gloss like silver, changing into the hue of copper. The abdomen is of a dirty livid appearance. Across the tail are two transverse bars, and on the tail fin a third, all of which have fewer dots than the adjacent parts. The eyes are white."

Hamilton Buchanan (MSS.) observes of this fish in the Ramghur district "the *Kunya tengra* of the Dharlá is a very ugly little fish, compared by the natives to a crow."

Habitat.—Rivers of Northern Bengal, where it attains about 6 inches in length.

Genus, 28—Euglyptosternum, *Bleeker.*

Aclyptostenon, Bleeker.

Dorsal profile nearly horizontal, head covered with soft skin. Gill-openings rather wide, the gill-membranes confluent with the skin of the isthmus, Mouth transverse, upper jaw the longer. Eyes small, subcutaneous. Nostrils close together, separated by a barbel. Barbels eight. Teeth villiform in the jaws and on the palate. Dorsal fin with a spine and six rays: an adipose dorsal present. Pectorals horizontal, with an adhesive apparatus on the chest formed

by longitudinal plaits of skin. Anal short (11 *to* 13 *rays*) *not continuous with the caudal which is forked. Ventrals situated posterior to the dorsal, and consisting of six rays. Air-vessel in two lateral portions, enclosed in bone.*

Geographical distribution.—River Coic near Aleppo, Upper Assam, and the Jumna.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Euglyptosternum lineatum*, A. 13. Brown, with a narrow light line along the middle of the side. Suddya in Upper Assam; also the river Jumna.

1. **Euglyptosternum lineatum,** Plate CXVI, fig. 7.

D. $\frac{1}{6}$/0, P. 1/10, V. 6, A. 12-13 ($\frac{3}{9\text{-}10}$), C. 17.

Length of head $4\frac{1}{4}$, of caudal $5\frac{2}{3}$ to 6, height of body 6 to 7 in the total length. *Eyes*—small, situated about 2 diameters behind or else in the middle of the length of the head, the width of the interorbital space 1/4 of the length of the head. Head rather flattened, its greatest width equals its length behind the nostrils. Upper jaw the longer, the width of the gape of the mouth equals half the length of the head. Lips smooth. Occipital process three times as long as wide at its base. *Barbels*—the nasal nearly reach to the orbit: the maxillary pair are as long as the head, the outer mandibular ones reach the gill-opening, the inner are shorter. *Teeth*—villiform in the jaws, and in one large patch extending across the palate, and so closely approximating to the premaxillary teeth that they appear like a single large band. Adhesive apparatus on the thorax distinct. *Fins*—the dorsal as high as the body, its spine strong, entire, and about half the length of the head: adipose dorsal of moderate height, the length of its base equalling that of the rayed fin, or half the interspace between the two fins. Pectoral spine very strong, smooth externally, denticulated internally with about 9 or 10 teeth, and reaching two-thirds of the distance to the base of the ventral. Caudal deeply forked. Skin smooth. *Caudal peduncle*—twice as long as high. *Colours*—brown, with a narrow light band along the side.

Habitat.—The specimen figured (life-size) was from the Jumna, I have procured it 12·5 inches in length near Suddya in Upper Assam.

Genus, 29—Pseudecheneis, *Blyth.*

Gill-openings small, not extending on to the lower surface of the head, the gill-membranes being attached to a very broad isthmus. Body somewhat elongate: head rather depressed. An adhesive apparatus formed of transverse folds of skin situated on the thorax between the bases of the pectoral fins. Eyes small, subcutaneous, on the upper surface of the head. Mouth transverse, small, inferior. Nostrils on either side approximating, being divided by a barbel. Barbels eight, the maxillary pair with broad bases. Teeth villiform in the jaws, palate edentulous. Dorsal fin with one spine and six rays: the adipose of moderate extent. Pectoral with its inner third vertical, its lower two-thirds horizontal, its spine feebly serrated. Ventral horizontal, having six rays, and situated below the dorsal. Caudal emarginate. Air-vessel in rounded lateral portions enclosed in bone.

This Genus is evidently formed for an existence in rapids.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Pseudecheneis sulcatus*, A. 11-13. Black, blotched with yellow, fins with black bands. Darjeeling and Khasya hills.

1. **Pseudecheneis sulcatus,** Plate CXVI, fig. 1.

Glyptosternum sulcatus, McClelland, Cal. Journ. Nat. Hist. ii, p. 587, pl. vi; Bleeker, Beng. p. 58.
Pseudecheneis sulcatus, Blyth, Proc. Asi. Soc. of Beng. 1860, p. 134; Günther, Catal. v, p. 264.

D. $\frac{1}{6}$/0, P. 1/13, V. 6, A. 11-13 ($\frac{2\text{-}4}{7\text{-}9}$), C. 17.

Length of head $7\frac{1}{2}$, of caudal 6, height of body 6 in the total length. *Eyes*—small, situated midway between the hind edge of the opercle and the nostrils: the width of the interorbital space equals $3\frac{1}{4}$ in the length of the head. Lower surface of the head with numerous papillæ, especially near the symphysis. The width of the head equals its length. *Barbels*—the maxillary pair with very broad bases, and about 1/3 of the length of the head. *Fins*—spine of anterior dorsal broad, weak, and with a soft termination, it is crenulated posteriorly: length of the base of the adipose dorsal as long as that of the interspace between the two fins. Pectoral large and extending to above the base or first third of the ventral, its spine is broad, finely ciliated externally in its lower 1/2, crenulated internally, especially in its posterior soft termination. In some specimens the under surface of the pectoral spine and first ventral ray are striated. Caudal emarginate, lower lobe the longer. The thoracic sucker has about 14 transverse folds. The free portion of the tail about three times as long as deep at its base. *Colours*—blackish, with some large, irregular, yellowish blotches. Fins yellow, with black bands.

Habitat.—Darjeeling and Khasya hills, attaining 7 to 8 inches in length. The specimen figured was from Darjeeling.

Genus, 30—Exostoma, *Blyth.*

Chimarrichthys, Sauvage.

Gill-openings narrow, the membranes confluent with the skin of a broad isthmus. Head depressed and covered superiorly with soft skin. No thoracic adhesive apparatus. Mouth inferior, with the lips reflected around the whole or most of its circumference, and usually covered with tubercles. Nostrils close together, separated by a barbel. Eight barbels. Teeth in the jaws in several rows: palate edentulous. Anterior dorsal fin with a rudimentary spine and six rays: adipose fin long and low. Pectorals vertical in their upper, horizontal in their lower half, the spine enclosed in skin. Ventral with six rays inserted some distance behind the rayed dorsal, its form as in the pectoral. Caudal square, emarginate or forked. Air-vessel enclosed in bone.

This peculiar mountain Genus has its lips adapted for a sucker, the chest likewise appears to form a flat adhesive surface, bounded by the striated rays of the pectoral and ventral fins.

Geographical distribution.—At present there are six species of this Genus known, four of which are included in this work. These fishes extend from the upper waters of the Indus, along the Himalayas, the Mishmee Mountains in East Assam, Tenasserim to Eastern Tibet on the confines of China.

SYNOPSIS OF SPECIES.*

A. *Teeth in jaws pointed.*

1. *Exostoma labiatum.* Lower labial fold uninterrupted. The interspace between the first and adipose dorsal fins equals equals 2/3 the length of the latter. Anal commences much nearer the base of the caudal than that of the ventral. Mishmee Mountains.
2. *Exostoma Blythii.* Lower labial fold interrupted. A short interspace between the dorsal fins. Anal commences in last 1/3 of the distance between ventral and base of caudal. Head waters or affluents of Ganges.
3. *Exostoma Berdmorei.* Snout more pointed. Caudal forked. Tenasserim.
4. *Exostoma Stoliczkæ.* Lower labial fold interrupted. Anal commences nearer the base of the ventral than that of the caudal. Pectoral does not extend to the ventral. Upper waters of Indus.

1. Exostoma labiatum.

Glyptosternum labiatus, McClell. C. J. N. H. ii, p. 580.

Exostoma labiatum, Blyth, P. A. S. of B. 1860, p. 155; Günther, Catal. v, p. 265; Day, Proc. Zool. Soc. 1869, p. 525.

D. $\frac{1}{6}$/0, P. $\frac{1}{11-12}$, V. 6, A. $\frac{1}{5}$, C. 17.

Length of head 1/5, of pectoral 1/5, of caudal 1/5, height of body 1/8 of the total length. *Eyes*—small, situated in the posterior two-fifths of the head. Mouth small, inferior, transverse: jaws in the form of a double crescent or ∽-shape. Lips broad, with a median and a lateral lobe on either side, having a barbel between. Nasal barbels reach the end of the snout: the maxillary extend to the pectoral fin. *Fins*—as in the preceding species. Caudal slightly forked. *Colours*—uniform.

Habitat.—Mishmee Mountains, East Assam.

2. Exostoma Blythii, Plate CXVII, fig. 2.

Day, Proceedings Zoological Society of London, 1869, p. 525.

D. $\frac{1}{6}$/0, P. $\frac{1}{17}$, V. 6, A. 8 ($\frac{2}{6}$), C. 13.

Length of head $4\frac{3}{4}$, of caudal $6\frac{1}{2}$, height of body 5 in the total length. *Eyes*—small, situated on the upper surface of the head, and the width of the interorbital space nearly equals the length of the snout, which is broad and depressed. Mouth inferior and transverse, sulcus behind lower lip interrupted. Gill-openings not continued on to the lower surface of the head. *Barbels*—the nasal about three times as long as the orbit: a fleshy appendage to the maxilla having a rudimentary barbel: two pairs behind the lower lip arising on a transverse line. *Teeth*—none on the palate. *Fins*—pectoral sub-horizontal, its rays plaited below: base of adipose more than twice as long as that of the rayed fin. Dorsal arising slightly in advance of the ventrals, its spine weak. Ventrals sub-horizontal. Caudal with its outer rays slightly produced, rendering it almost lunated. *Air-vessel*—small, in two rounded lobes, both enclosed in a bony capsule. *Colours*—yellowish brown.

* The other two species alluded to are as follows:—

E. Davidi. The interspace between the two dorsal fins equals the length of the latter. Pectoral reaches ventral. Eastern Tibet.

B. *Outer row of teeth compressed.*

E. Andersonii. Lower labial fold interrupted. Bhamo.

Habitat.—Rivers below Darjeeling. I was given some specimens up to $3\frac{1}{5}$ inches long, by Dr. Stoliczka, who obtained them from that locality.

3. Exostoma Berdmorei.

Blyth, P. A. S. of B. 1860, p. 155; Günther, Catal. v, p. 265; Day, Proc. Zool. Soc. 1869, p. 526.

D. $\frac{1}{6}$ | 0, P. $\frac{1}{10}$, V. 6, A. 6, C. 14.

Maxillary *barbels* reach the base of the pectoral fin. The snout is much more pointed than in the other species. *Fins*—caudal rather deeply forked. *Colours*—"dingy olive-brown, with obscure dark broad bands, presenting more or less of a clouded appearance: the fins mostly darker, below pale."

Habitat.—Tenasserim. The typical specimen (4 inches long) in the Calcutta Museum, is in such a very bad state of preservation that I cannot add more to Blyth's description.

4. Exostoma Stoliczkæ, Plate CXVII, fig. 3.

Day, Proceedings Zoological Society, 1876, p. 782.

D. $\frac{1}{6}$ | 0, P. 1/12, V. 6, A. 6, C. 15.

Length of head from 4 in the young* to $5\frac{2}{3}$ in the adult, of caudal 8, height of body $7\frac{1}{4}$ in the total length. *Eyes*—minute, situated in the middle of the length of the head: the width of the interorbital space equals half the length of the snout, or the distance between the eye and the front nostril. Head depressed, as broad as long, and obtusely rounded. Mouth inferior: lips thick, and studded with small tubercular elevations: the upper and lower lips continuous at the angle of the mouth, but the transverse fold across the lower jaw is interrupted in the middle. Nostrils close together, the anterior round and patent, the posterior tubular; a barbel divides the two nostrils, it is situated on a bridge of skin, below which the two nostrils are continuous. *Barbels*—the nasal ones reach the hind edge of the eye: the maxillary ones have a broad basal attachment, and reach the root of the pectoral. Of the mandibular barbels the anterior are situated just behind the inner end of the lower labial fold: they are shorter than the outer pair, which latter extend to the gill-opening. Gill-opening situated on the side of the head in front and above the base of the pectoral fin. *Teeth*—several rows of pointed ones in each jaw, of which the outer is slightly the larger, rather wide apart, and with rather obtuse summits. *Fins*—the dorsal arises midway between the snout and the commencement of the adipose fin; its greatest height is one-third more than the length of its base: its spine is rudimentary and enveloped in skin. Adipose dorsal very long and low, posteriorly in some instances it is free, in others it almost appears to decrease in height and join the free portion of the tail. Pectoral nearly as long as the head, having its outer half horizontal and its inner vertical: its spine is rudimentary, with a broad, striated, cutaneous covering. Ventral of a similar form to the pectoral; its first and a portion of its second ray also with a striated cutaneous covering: the fin commences on a vertical line falling just behind the base of the dorsal fin: it is rather nearer the snout than the posterior end of the adipose dorsal, and commences midway between the bases of the ventral and caudal fins: it is half higher than long. Caudal cut almost square. Free portion of the tail one-half higher than long. *Skin*—tuberculated from the head along the lower surface of the body to nearly as far as the bases of the ventrals. *Colours*—of a dull yellowish green, becoming lightest along the abdomen. Fins yellowish, with dark edges or bands.

Habitat.—Lek or Ladak, and along the head waters of the Indus, attaining about 7 inches in length.

* The remarkable difference in the comparative length of the head to that of the total is shown in the following figures:—

3	specimens	4	inches in length.	Head	4 to $4\frac{1}{3}$	in the total length.
4	„	4·2 to 4·5	„	„	$4\frac{1}{3}$ to $5\frac{1}{4}$	„
5	„	5·0 to 5·7	„	„	5 to $5\frac{1}{2}$	„
3	„	6·0 to 6·6	„	„	$5\frac{1}{2}$ to $5\frac{2}{3}$	„
2	„	7	„	„	$5\frac{1}{3}$ to $5\frac{1}{2}$	„

FAMILY, II—SCOPELIDÆ, *Müller*.

Branchiostegals as a rule numerous. Pseudobranchiæ well developed. Gill-openings very wide. Opercular pieces sometimes incomplete. Margin of the upper jaw formed by the premaxillaries. Barbels absent. Two dorsal fins, the posterior being adipose. Scales present or absent. Ova enclosed in sacs in the ovaries and excluded by oviducts. Intestinal canal short. Pyloric appendages, when present, few in number. Air-vessel small or absent.

Geographical distribution.—These fishes, which in many respects are allied to the *Siluroids*, appear to be distributed throughout tropical, sub-tropical, and temperate seas.

SYNOPSIS OF GENERA.

1. *Saurus.* A single band of palatine teeth. Ventral with eight rays, the inner being the longest.
2. *Saurida.* Two parallel bands of palatine teeth. Ventral with nine rays: the inner not much longer than the outer ones.
3. *Harpodon.* Premaxillaries but no superior maxillaries. Bones of head soft. Ventral with nine rays. Caudal tri-lobed. Thin and deciduous scales present in the last three-fourths of the body.
4. *Scopelus.* Bones of head ossified. Scales rather large. Luminous spots along the body.

Genus, 1—Saurus, sp. *Cuvier*.

Synodus, pt. Gronovius; *Laurida*, pt. (Aristotle) Swainson.

Branchiostegals from eight to seventeen. Gill-openings very wide, the gill-membranes not attached to the isthmus. Body elongated, subcylindrical: head oblong, muzzle short. Eyes of moderate size, lateral. Gape of mouth wide, cleft very deep: edge of the upper jaw entirely formed by long and thin premaxillaries: the maxillary likewise elongated, thin, and adherent to the premaxillaries. Teeth numerous, pointed, some are elongated, slender, and can be laid downwards and inwards: they exist on the jaws, tongue and palatine bones, a single band being on the palate and usually none or only a few on the vomer. First dorsal with a moderate number of rays, situated nearly in the middle of the length of the fish: adipose fin small. Ventral with eight rays, the internal ones being the longest: it is inserted anterior to the origin of the dorsal and not far behind the pectorals, which are short: anal of moderate length or short. Caudal forked. Scales of moderate size. Lateral-line entire. Pyloric appendages few.

Geographical distribution.—Tropical portions of the Atlantic and Pacific Oceans; Mediterranean.

SYNOPSIS OF SPECIES.

1. *Saurus Indicus*, D. 13/0, A. 9, L. l. 55-57, L. tr. $3\frac{1}{2}/7$. Head pointed. Madras.
2. *Saurus myops*, D. 12-13/0, A. 16-17, L. l. 52-56, L. tr. $3\frac{1}{2}/7$. Snout obtuse. A black shoulder spot. Longitudinal lines along the body. Seas of India and tropical portions of the Atlantic and Pacific Oceans.

1. Saurus Indicus, Plate CXVII, fig. 4.

Day, Journal of Linnean Society, Zoology, xi, 1873, p. 526.

B. xv, D. 13/0, P. 14, V. 8, A. 9, C. 19, L. l. 55-57, L. tr. $3\frac{1}{2}/7$.

Length of head $4\frac{1}{3}$, of caudal $7\frac{1}{4}$, height of body $7\frac{1}{2}$ to 8 in the total length. *Eyes*—without adipose lids, diameter $5\frac{2}{3}$ in the length of head, rather more than 1 diameter from the end of snout, and nearly 1 apart: the width of the snout at its base equals its length. Greatest width of the head not quite 1/2 its length. Inter-orbital space somewhat concave. Upper jaw slightly the longer. Cleft of mouth extending to far behind the eyes. The hinder portion of the frontal and occipital bones on the summit of the head corrugated. *Teeth*—the inner row in the jaws the longest, some in the mandible barbed. Five rows of large teeth on the tongue. A single band on the palatines of which the inner row is much the largest. *Fins*—dorsal about as long as high. Pectoral reaches to the tenth scale of the lateral-line. Inner ventral rays the longest, the fin reaches nearly half way to the base of the anal. Caudal deeply forked. *Scales*—17 rows between occiput and base of dorsal fin. Those along the lateral-line rather raised, but not distinctly keeled. *Colours*—brownish in the upper two-thirds, dirty white beneath. Numerous bluish irregular spots or blotches along the back and sides, in places almost forming horizontal bands. Dorsal and caudal white, with grayish spots, forming irregular horizontal bands.

Habitat.—Madras to 7 inches in length.

2. Saurus myops, Plate CXVII, fig. 5.

Salmo fœtens, Bloch, t. 384, f. 2; Bl. Schn. p. 404 (not Linn.).
Salmo myops, (Forst.) Bl. Schn. p. 421; Forst. Desc. Anim. p. 412.
Osmerus lemniscatus, Lacép. v, p. 236, t. vi, f. 1.
Saurus fasciolatus, Lesseur, apud Val.
Saurus elegans, Gray.
Saurus truncatus, Spix Pisc. Bras. p. 82, t. 45.
Saurus limbatus, Eyd. and Soul. Voy. Bonito, Poiss. p. 100, t. vii, f. 3.
Saurus myops, Cuv. Règ. Anim.; Cuv. and Val. xxii, p. 485; Bleeker, Beng. p. 76, and Nat. Tyds. Ned. Ind. iii, p. 291, and Atl. Ich. Saurida, t. 2, f. 3; Jerdon, M. J. L. and Sc. 1851, p. 146; Günther, Catal. v, p. 398.
Laurida fœtens and *truncata*, Swainson, Fishes, ii, p. 288.
Saurus trachinus, Schlegel, Fauna Japon. Poiss. p. 231, pl. 106, f. 2; Cantor, Catal. p. 271.
Saurus lemniscatus, Rich. Ich. China, p. 301.
Synodus myops, Bleeker, Atl. Ich. vi, p. 153.

B. xvi, D. 12-13 | 0, P. 14, V. 8, A. 16-17, C. 17-19, L. l. 52-56, L. tr. $3\frac{1}{2}/7$.

Length of head $4\frac{1}{4}$, of caudal $6\frac{1}{2}$ to 7, height of body 6 in the total length. *Eyes*—without adipose lids, diameter 1/6 of length of head, 1/2 to 3/4 of a diameter apart, and also from the end of snout. Dorsal profile nearly horizontal: greatest width of head equals half its length. Cleft of mouth extending to at least two diameters behind the orbit: jaws of about equal length anteriorly. Interorbital space deeply concave: summit of head corrugated except the interorbital furrow. *Teeth*—pointed, two rows in the upper, three in the lower jaw, the inner being the longest. A single two-rowed band on the palate. Tongue likewise toothed. *Fins*—first dorsal rather highest anteriorly, nearly square, commences midway between the snout and the second dorsal, its first two rays unbranched: second dorsal very small: pectoral small and rounded at its extremity: ventral sub-horizontal, with its inner rays the longest, it is as long as the head. Caudal forked, with its lower lobe the longer. *Scales*—arranged in horizontal rows which are rather undulating above the lateral-line: six transverse rows on cheek: none on summit of head or on lower jaw. *Lateral-line*—slightly raised in single tubes, with a small elevation on either side. *Colours*—upper half of body of a golden colour, with four longitudinal blue lines having black edges, and nearly as wide as the ground colour. A black spot at shoulder. Abdominal surface silvery. Dorsal fin with three rows of yellow spots: a yellow band along the middle of the pectoral: outer half of anal yellow.

Habitat.—Seas of India to the Malay Archipelago and the tropical portions of the Atlantic and Pacific Oceans. The specimen figured was from Madras.

Genus, 2—Saurida, *Cuv.*

Synodus, pt. Gronovius; *Laurida*, pt. (Artedi) Swainson.

Differs from *Saurus* as follows:—*Teeth cardiform, the inner ones being the longest and slender, all can be laid downwards and inwards, they exist on the jaws, tongue, and palatine bones: those on the palate are in two parallel bands on either side, the inner being the shorter. Ventral fin with nine rays, the inner not much longer than the outer ones. Pectoral short or of moderate length.*

SYNOPSIS OF SPECIES.

1. *Saurida tumbil*, D. 11-13/0, A. 10-11, L. l. 53-64, L. tr. $4\frac{1}{2}/7$. From the Red Sea through the seas of India to China and Japan.
2. *Saurida nebulosa*, D. 10-11/0, A. 9, L. l. 50-52, L. tr. $3\frac{1}{2}/7$. East coast of Africa, seas of India to the Malay Archipelago and beyond.

1. Saurida tumbil, Plate CXVII, fig. 6.

Salmo tumbil, Bloch, t. 430; Bloch, Schneider, p. 405.
Salmo, Russell, Fish. Vizag. ii, p. 56, and *Badi mottah*, plate 172.
Osmerus tumbil, Lacépède, v, page 236.
Saurus tumbil and *badi*, Cuv. Règ. Anim.; Cantor, Catal. p. 270; Jerdon M. J. L. and Sc. 1851, p. 146.
Saurus badimottah, Rüppell, N. W. Fische, p. 77.
Laurida tombel, Swainson, Fishes, ii, p. 288.
Saurus argyrophanes, Richardson, Ich. China, p. 302.
Saurus undosquamis, Richardson, Erebus and Terror, Ich. p. 138, t. 51, f. 1-6.
Aulopus elongatus, Schlegel, Fauna Japon. p. 233, t. 105, f. 2.
Saurida tombil, Cuv. and Val. xxii, p. 500; Bleeker, Chiroc. p. 20.
Saurida tumbil, Bleeker, Bengal, p. 76, and Sumatra, p. 56, and Atl. Ich. vi, p. 155, and Saurid. t. i, f. 4.; Günther, Catal. v, p. 399; Kner, Novara Fische, p. 315; Day, Fish. Malabar, p. 200; Klunz. Verh. z. b. Ges. Wien, 1871, p. 51.

Saurida argyrophanes and *undosquamis*, Günther, Catal. v, p. 400.
Arranna, Mal.; *Oolooway* and *Cul-nahmacunda*, Tamil.

B. xiii-xvi, D. 11-13/0, P. 14-15, V. 9, A. 10-11, C. 19, L. l. 53-64, L. tr. $4\frac{1}{2}$/7, Vert. 53.

Length of head $4\frac{1}{2}$ to $5\frac{1}{3}$, of caudal $5\frac{1}{2}$ to 6, height of body $7\frac{1}{2}$ to 8 in the total length. *Eyes*—with broad adipose lids, diameter 5 in the length of head, $1\frac{1}{4}$ diameters from the end of snout, and the same apart. Cleft of mouth extending to $1\frac{1}{2}$ diameters behind the orbit. *Teeth*—several rows of card-like teeth in the upper jaw, the internal the largest, and the external smallest: the surface of the premaxillaries on which they are placed is bevilled off, so as to look outwards. The teeth on the mandibles are of the same character, the largest rows internal and smallest external: they are more numerous than in the upper jaw, and placed on a surface looking upwards and outwards. Teeth on palate in two distinct parallel patches, the external row in each of which is the largest, whilst the inner is only one-third the length of the outer row: a small round patch of teeth generally on the vomer, and small ones on the tongue. *Fins*—first dorsal in the centre of the body: the adipose dorsal is situated over the last two anal rays. Caudal deeply forked. *Scales*—over the body and head, with some on the base of the caudal fin. *Lateral-line*—the keel is most developed in the posterior third of the body. *Colours*—brownish-gray along the back, becoming white beneath, the whole having yellow reflections. In some the dorsal and upper half of the caudal fins are barred in spots. In others (as the one figured) there are no spots, and the middle of the pectoral and ventral are sometimes almost black.

Habitat.—From the Red Sea through the seas of India to the Malay Archipelago, China and Japan. As food it is rather dry and insipid. The specimen figured (from Madras) is 8 inches in length.

2. Saurida nebulosa.

Dentex nebulosus (Solander) Cuv. and Val. xxii, p. 506.
Saurus gracilis, Quoy. and Gaim. Voy. Uranie, p. 222.
Saurus à bandes et taches, Liénard, Dixième, Rapp. Maur. Hist. Nat. Soc. 1839, p. 41.
Saurida nebulosa, Cuv. and Val. xxii, p. 504, t. 648; Bleeker, Moluc. p. 292, Chiroc. p. 30, and Atl. Ich. vi, p. 156, Saurida, t. i, f. 1; Günther, Catal. v, p. 399; Kner, Novara Fische, p. 316; Klunz. Verh. z. b. Ges. Wien, 1871, p. 591.

B. xii-xiii, D. 10-11/0, P. 12-13, V. 9, A. 9-10, C. 19, L. l. 50-52, L. tr. $3\frac{1}{2}$/6.

Length of head $4\frac{3}{5}$ to $5\frac{1}{5}$, of caudal $6\frac{1}{4}$, height of body $6\frac{1}{2}$ to 9 in the total length. *Eyes*—diameter 4 to $5\frac{1}{2}$ in the length of the head, rather above 1 diameter from end of snout, and 3/4 to 1 diameter apart. Jaws anteriorly of the same length: snout somewhat pointed, the maxilla extends nearly to the angle of the preopercle. *Teeth*—thin and pointed, in several rows in the jaws, the outer being the longer, and moveable: none on the vomer: in two bands on the palate, the outer twice as long as the inner. *Fins*—dorsal higher than long, situated midway between the anterior end of the snout and the base of the caudal fin. Pectoral reaches to the ninth scale of the lateral-line. Ventral as long as the head excluding the snout. *Scales*—forming a slight ridge in the last portion of the lateral-line. *Colours*—brownish, becoming lightest below: a series of bars or blotches along the middle of the sides: fins barred.

Bleeker observes that in specimens from the Malay Archipelago none had vomerine teeth, whereas such were constant in *S. tumbil.*

Habitat.—From the Red Sea, Madagascar, and the coasts of Zanzibar, to the Mauritius, through the seas of India to the Malay Archipelago and beyond.

Genus, 3—Harpodon, *Lesueur.*

Triurus, Swainson: *Sauridichthys*, Bleeker.

Branchiostegals from twenty-three to twenty-five. Gill-openings wide. Body elongated and compressed. Eyes small. Snout short, bones of head soft and partly modified into wide muciferous channels. Cleft of mouth deep: margin of the upper jaw formed by the premaxillaries which are thin and tapering: maxillaries absent. Teeth cardiform, recurved and of unequal size, the largest being on the mandibles and barbed. Teeth exist on the premaxillaries, mandibles, palatines, the tongue and hyoid bone, those on the palatines are large and can be laid downwards. Dorsal fin in the middle of the length of the body, with a moderate number of rays: adipose fin small. Pectorals and ventrals long, the latter with nine rays, and inserted below the anterior dorsal ones, at some distance behind the pectorals. Anal of moderate length. Caudal tri-lobed. Scales thin and deciduous, none on the anterior portion of the body. Air-vessel absent. Pyloric appendages sixteen.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Harpodon nehereus.* D. 12-13/0, A. 13-15. No scales (except along the lateral-line) anterior to the dorsal and ventral fins. Caudal tri-lobed. From Zanzibar through the seas of India to China.

1. Harpodon nehereus, Plate CXVIII, fig. 1.

Silurus, Russell, ii, p. 55, and *Wanah mottah*, pl. 171.
Salmo (Harpodon) microps, Lesueur, J. Acad. N. Sc. Phil. 1825, p. 48, pl. iii, f. 1.
Osmerus ? nehereus, Hamilton Buchanan, Fish. Ganges, pp. 209, 379.
Laurida microps, Swainson, Fishes, ii, p. 246, f. 49.

Triurus microcephalus, Swainson, Fishes, ii, p. 288.
Harpodon microps, Swainson, Fishes, ii, p. 288; Bleeker, Sumatra, p. 56.
Saurus nehereus, Richardson, Ich. China, p. 301; Cantor, Catal. p. 273.
Saurus ophiodon, Cuv. Règ. Anim.; Cuv. and Val. xxii, p. 490; Bleeker, Chiro. p. 18; Jerdon, M. J. L. and Sc. 1851, p. 147.
Sauridichthys ophiodon, Bleeker, en Pisc. Java, p. 437.
Harpodon nehereus, Günther, Catal. v, p. 401; Day, Fish. Malabar, p. 201; Bleeker, Atl. Ich. vi, p. 157, and Saurid. t. ii, f. 2.
Bummaloh or "Bombay duck," *Cucah sawahri*, or *Coco mottah*, Tel.

B. xxiii-xxvi, D. 12-13 | 0, P. 11-12, V. 9, A. 13-15, C. 19, Vert. 38, Cæc. pyl. 16 (22).

Length of head $5\frac{1}{4}$ to 6, of caudal 6, height of body $6\frac{1}{2}$ to $7\frac{1}{2}$ in the total length. *Eyes*—diameter 1/16 of the length of the head, 2 diameters from the end of snout, and 4 apart. Body compressed, snout short and obtuse. Lower jaw the longer, the cleft of the mouth almost reaches the preopercular angle. Opercular pieces diaphanous and apparently more or less blended together. *Teeth*—recurved and erectile. Those of the jaws and some on the palatines have a single barb at the posterior margin of the point, a few of the former are arrow-shaped. In both jaws appear three series of somewhat distant teeth: the external consists of excessively minute ones, the second of longer, and the internal series the longest. Those of the lower jaw are longer than those of the upper, particularly three or four on each side of the symphysis. The pharyngeals and palatals contain two rows. The fourth anterior tooth of each palatal is very long. Fine teeth on the tongue, hyoid bone and the upper margin of the branchial arches. *Fins*—the first dorsal is situated midway between the snout and the root of the caudal: the ventral opposite the dorsal, midway between the snout and the last ray of the anal: the first anal ray midway between the last ray of the dorsal and the root of the caudal: the adipose dorsal opposite the posterior third of the anal. The point of the ventral reaches to the middle of the anal, a long thin elongated scale is situated at its base. The adipose dorsal is rather large. The caudal divided into three pointed lobes, of which the centre is rather the shortest. The pectorals are falciform, and in the young reach to the last dorsal ray, but become shorter with age. *Scales*—commence opposite the origin of the dorsal fin, all are diaphanous, and can with but difficulty be distinguished in the fresh fish. *Lateral-line*—rather nearer to the back than to the abdomen: it is slightly keeled with about forty fine rectangular membranous pieces, covered with scales like the rest on the body. Intestines the length of the abdominal cavity being destitute of any convolutions. *Colours*—head, back, and sides semi-transparent like gelatine, light-grayish, with minute starlike black or brownish dots: anterior part of the abdomen pale, silvery-bluish: rest grayish-white: cheeks and opercles pale silvery-bluish, dotted like the body: fins transparent, coloured like the body, but more closely dotted, as to appear grayish and black at their extremities, in some specimens the fins are black. Iris golden.

This fish is highly esteemed as food, whether fresh or salted, in the latter form it is extensively employed as a relish with curries, and is known as the Bombay duck.

Habitat.—From Zanzibar to China, seas and estuaries of India, most common at Bombay but decreasing in numbers down the Malabar coast. It is not very common at Madras but augments in numbers up the Coromandel Coast, being very abundant in the rivers and estuaries of Bengal and Burmah. Bleeker observes that it appears to be very abundant in the straits of Malacca, more rare at Java, and uncommon at Batavia. It attains at least 16 inches in length. The specimen figured (life-size) was from Bombay.

Genus, 4—SCOPELUS,* *Cuvier.*

Myctophum (Nyctophus), *Lampanyctus*, Cocco: *Alysia*, Lowe: *Neoscopelus*, Johnson: *Ceratoscopelus*, *Dasyscopelus*, Günther.

Branchiostegals eight to ten. Gill-openings very wide. Body oblong and compressed. Eyes large: sometimes a supraorbital spine. Snout short. Bones of head thin, but osseous. Cleft of mouth very deep: premaxillaries long and tapering: maxillaries well-developed. Teeth villiform in both jaws, on the palatines, pterygoids, and on the tongue: usually absent from the vomer except in some large specimens. Rayed dorsal fin in about the middle of the length of the body: a small adipose one likewise present. Pectoral well-developed, as is also the ventral which has eight rays. Anal rather long. Caudal forked. Scales large, smooth, or with rough edges, or even minute spines. Air-vessel small. Pyloric appendages few.

* The following sub-divisions of the Genus have been adopted:—
A. The number of dorsal rays more than those of the anal.
1. Scales of lateral-line enlarged.
2. „ „ scarcely, if at all, enlarged. *Notoscopelus.*
B. The number of dorsal rays, less than, or equal to, those of the anal.
1. Eye one-third or more in length of head. No supraorbital spine.
a. Scales smooth, *Myctophum.* *b.* Scales with rough edges, *Dasyscopelus.*
2. Eye large: a supraorbital spine. *Ceratoscopelus.*
3. Eyes less than 1/3 of length of head.
a. Scales smooth: those of lateral-line enlarged. *Alysia.*
b. Scales smooth: of unequal sizes. *Lampanyctus.*
c. Scales with minute spines. *Neoscopelus.*

These fishes have a row of luminous spots along the lower portion of the body, sometimes they are also present on the head, snout and back of tail, whilst a few may exist on the sides.

Geographical distribution.—Temperate and tropical seas.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Scopelus Indicus*, D. 10/0, A. 18, L. l. 43, L. tr. $3\frac{1}{2}/5$. No supraorbital spine. Scales smooth. India.

1. Scopelus Indicus, Plate CXVIII, fig. 2.

D. 10/0, P. 14, V. 8, A. 18, L. l. 43, L. tr. $3\frac{1}{2}/5$.

Length of head 5, of caudal $6\frac{1}{2}$, height of body $4\frac{1}{2}$ in the total length. *Eyes*—diameter $2\frac{1}{3}$ in the length of head, 1/4 of a diameter from the end of snout, and also apart. No spine above the orbit. Cleft of mouth reaches almost to the preopercular angle. *Fins*—the dorsal is situated midway between the base of the caudal fin and the front edge of the eye, it is not quite so high as the body below it. Pectoral reaches the middle of the ventral, whilst the ventral nearly extends to the anal. Caudal slightly forked. *Scales*—smooth, the row beneath the lateral-line is much larger than the others. *Colours*—of a deep metallic blue in the upper portion of the body, becoming lighter on the sides and beneath. A line of round golden spots along the lower edge of the abdomen, and a few larger ones scattered over the sides.

In general appearance this species much resembles *Scopelus spinosus*, Steind. Sitz. Akad. Wiss. 1867, p. 11, t. iii, f. 4, but its scales are entirely smooth.

Habitat.—A single specimen, now in a bad state, was collected by Sir Walter Elliot at Vizagapatam. It would belong to sub-genus *Myctophum*.

Family—SALMONIDÆ.

Pseudobranchiæ present. Margin of the upper jaw formed by the premaxillaries and maxillaries. No barbels. A single rayed and posteriorly an adipose dorsal fin. Pyloric appendages usually present and mostly numerous Body scaled, head scaleless. Air-vessel large, simple, and with a pneumatic duct. The ova pass into the cavity of the abdomen before being excluded.

Were this work strictly limited to the indigenous Fishes of India, the Family of Salmonidæ should be omitted, as the Hindoo Koosh is the nearest locality to Hindustan, where they are found.* But as the *Salmo Levenensis* and the cyprinoid *Tinca vulgaris* have been introduced into the waters of the Neilgherry hills, where they appear to be thriving in a wild state, I have considered it better to record them, in order to prevent misconception as to how they came there, when they shall be rediscovered at a future date.

In introducing exotic fishes, one of the first considerations must necessarily be to ascertain whether any representatives of the Family are normally resident in the region it is desired to stock? If such do exist, the question arises, are they a thriving or a diminutive race? It has been maintained that if the latter, the chances of success are too small to render the attempt worth making, as the region is unsuited for their development.

India, however, is peculiarly situated. Doubtless at a remote period the continent to the south of the Ganges was divided by the sea from the Himalayas, and therefore the entire absence of fresh-water Salmonidæ cannot be looked upon in either a favourable or an unfavourable aspect. I suggested to the Governor of Madras, Sir William Denison, introducing trout into the waters of the Neilgherry hills by means of their ova transported from Europe in ice. My attempt failed.† Wise after the event and may-be not anticipating that it would be renewed, Dr. Günther chronicled my failure, remarking as "has been foreseen by all acquainted with the nature of Salmonoid fishes."‡

Since then I have had no further opportunity to carry out my experiment, but the late Mr. McIvor, of the Government Gardens at Ootacamund, who assisted me in my endeavour, was so sanguine of eventual success, that he resolved to try and bring out from Loch Leven some live fish. Always ready with an expedient to meet changing circumstances he succeeded in introducing trout, tench, gold carp and eels into the Neilgherry hills.

My figure is from a trout bred in a wild state, and captured on the Koondahs in 1876. For it I am indebted to T. Sullivan Thomas, Esq., of the Madras Civil Service, who received it from Mr. McIvor. Whether the success will continue must depend on two causes, the first climatic, the second whether the breed will be exterminated by man.

Genus, 1—Salmo.

Definition as in the family: pyloric appendages numerous.

Salmo levenensis, Plate CXVIII, fig. 3.

Walker: Yarrell: Günther: Day, Journal Linn. Society, xii, p. 567.

This species is too well known to need description.

Colours—twelve vertical bands demonstrating its being a young fish. The spots which are now black were originally red. The nature of the water and the soil through which it flows exercise great influence on the colour of fishes, and this specimen was bred in a clear hill stream. In Loch Leven, according to Mr. Pennell, the trout have no red spots.

Habitat.—Neilgherry hills, introduced from Loch Leven.

* *Salmo Orientalis*, McClelland, or *S. Oxianus*, Kessler.
† Proceedings Zoological Society, 1867, p. 281.
‡ Zoological Record, 1867, p. 131.

FAMILY, III—SCOMBRESOCIDÆ.

Pharyngognathi malacopterygii, Müller.

Pseudobranchiæ concealed, glandular. Margin of the upper jaw formed, mesially by the premaxillaries, laterally by the maxillaries. Barbels present or absent. Lower pharyngeals united into a single bone. Dorsal fin rayed, with or without finlets posterior to it, situated opposite the anal, and in the caudal portion of the vertebral column: no adipose dorsal. Scales present, frequently a keeled row along either side of the free portion of the tail. Air-vessel generally present, sometimes cellular, and destitute of a pneumatic duct. Stomach and intestines in one straight undivided tube. Pyloric appendages absent.

SYNOPSIS OF GENERA.

1. *Belone*. Both jaws elongated into a beak. No finlets.
2. *Hemirhamphus*. Upper jaw short, the lower elongated into a beak.
3. *Exocœtus*. Jaws short: pectoral fins elongated into organs for flying.

Genus, 1—BELONE, *Cuvier*.

Mastacembelus, (Klein), Bleeker: *Rhamphistoma*, Raf.: *Tylosurus*, Cocco: *Potamorrhaphis*, Günther.

Branchiostegals rather numerous. Gill-openings wide. Body elongated, sub-cylindrical or compressed. Eyes lateral. The jaws prolonged into a beak, the upper of which is formed by the premaxillaries. Fine teeth, or rugosities in both jaws, with a single row of long, widely-set conical ones: palate toothed or toothless. The anterior dorsal rays may or may not be elevated, forming a lobe to the fin, whilst the middle and posterior ones may be short or elongated: no finlets: caudal usually forked. Scales small. Lateral-line on free portion of tail, with or without a keel.

Uses.—These Gar-fish are but indifferent as food, whilst their bones are green, as observed in the European forms. They are very destructive amongst young and small fishes.

In very young specimens the jaws are said not to be prolonged, and as age increases the mandibles are considerably advanced before the premaxillaries. Distinct varieties appear to be present in some species, as *Belone cancila*, some of the inland forms of which have an elevation along the back.

It has been observed that one might form Genera on some of the following characters:—on the comparative lengths and formation of the dorsal and anal fins: or whether the caudal is truncated, rounded, or forked: if the free portion of the tail is depressed: if a keel exists or is absent.

SYNOPSIS OF SPECIES.

I. *Anterior dorsal rays elevated, forming a lobe.*

a. Caudal forked.

1. *Belone melanostigma*, D. 24-26, A. 25-27. Length of head $4\frac{1}{3}$ in the total. No teeth on vomer. From one to seven dark blotches along the side. Red Sea, those of India to the Malay Archipelago.

2. *Belone annulata*, D. 22-24, A. 20-22. Length of head $3\frac{2}{3}$ in the total. Eyes $2\frac{1}{2}$ in postorbital length of the head. No vomerine teeth. Red Sea, those of India to the Malay Archipelago.

3. *Belone choram*, D. 22-23, A. 19-20. Length of head $3\frac{1}{2}$ to $3\frac{1}{3}$ in the total. No teeth on vomer. Eye equals half of postorbital length of the head. No vomerine teeth. Red Sea, those of India to the Malay Archipelago.

b. Caudal truncated or rounded.

4. *Belone leiurus*, D. 19, A. 22-24. Length of head about 3 in the total. No teeth on vomer. Seas of India to the Malay Archipelago.

5. *Belone cancila*, D. 15-18, A. 16-18. Length of head $2\frac{2}{3}$ to $2\frac{3}{4}$ in the total. No teeth on the vomer. Fresh waters of Sind, India, Ceylon and Burma.

6. *Belone strongylurus*, D. 13-15, A. 16-18. Length of head $2\frac{2}{3}$ to 3 in the total. No teeth on the vomer. A black spot on the caudal fin. Seas and coasts of India to the Malay Archipelago and beyond.

1. Belone melanostigma.

(Ehrenb.) Cuv. and Val. xviii, p. 450; Günther, Catal. vi, p. 241; Klunz. Verh. z. b. Ges. Wien, 1871, p. 581.

Belone gracilis, Schlegel, Fauna Japon. Poiss. p. 246, t. 110, f. 1; Bleeker, Japan, 116 (not Lowe).

Belone schismatorhynchus, Bleeker, Nat. Tyds. Ned. Ind. i, p. 95, Snoek, Vissch. p. 15.
Mastacembelus gracilis, Bleeker, Ned. Tyds. Dierk. iii, p. 230.
Mastacembelus schismatorhynchus, Bleeker, Atl. Ich. vi, p. 49, Scombres. t. xii, f. 2.

B. xiii-xiv, D. 24-26, P. 14, V. 6, A. 25-27, C. 15.

Length of head $4\frac{1}{2}$, of caudal 11, height of body 14 in the total length. *Eyes*—diameter equals the width of the interorbital space, and 2/5 of that of the postorbital portion of the head. A wide median groove along the summit of the head: superciliary region slightly striated longitudinally. Maxillary nearly concealed by the preorbital. Tongue without asperities. *Teeth*—none on the vomer: those in the jaws strong. *Fins*—the anterior dorsal rays from the second to the fourth produced, rendering the fin falciform: the anal commences rather in advance of the dorsal, and is of the same shape: pectoral as long as the head behind the anterior nostril, and when laid forwards reaches the anterior edge of the orbit. Ventral fin situated midway between the posterior margin of the eye and the end of the base of the anal: caudal forked. Free portion of tail somewhat compressed. *Lateral-line*—not forming a keel. *Scales*—minute. *Colours*—pectoral nearly black externally: from one to seven large black blotches along the side, which appear to be occasionally absent in the females.

Habitat.—Red Sea to the Malay Archipelago. A fine specimen 35 inches long, captured off the coast, exists in the Madras Museum. I obtained, in Bombay, both in November and February, some fine female specimens full of roe, unfortunately I was unable to preserve them.

2. **Belone annulata**, Plate CXX, fig. 1.

Esox, Russell, Fish. Vizag. ii, p. 60, and *Wahlah Kuddera*, fig. 175.
? *Belone Indica*, Les. Journ. Acad. Nat. Sci. Phil. 1821, p. 131.
Belone gigantea, Temm. and Schleg. Fauna Japon. Poiss. p. 245; Bleeker, Japon, p. 21, and En. Pisc. p. 156.
Belone annulata, Cuv. and Val. xviii, p. 447, f. 550; Cantor, Catal. p. 244; Bleeker, Beng. p. 72; Jerdon, M. J. L. and Sc. 1851, p. 147; Day, Fish. Mal. p. 165; Günther, Catal. vi, p. 240.
Belone melanurus and *cylindrica*, Bleeker, Madura, p. 11, and Snoek, p. 13; Kner, Novara Fische, p. 321.
Mastacembelus choram, Bleeker, Mastacemb. p. 227.
Mastacembelus annulatus, Bleeker, Atl. Ich. vi, p. 48, Scomb. t. xii, f. 3.
Pahmum kolah, Tamil.

B. xii-xv, D. 22-24, P. 12-15, V. 6, A. 20-22, C. 15.

Length of head $3\frac{2}{3}$, of caudal 9 to 10, height of body 13 to 20 in the total length. Width of body equals its height. *Eyes*—diameter $2\frac{1}{2}$ in the postorbital length of the head, and 2/3 of a diameter apart. Interorbital groove broad and shallow, striated along its anterior portion. Base of premaxillaries depressed and almost concealing the maxilla. *Teeth*—strong, none on the vomer. Tongue covered with tubercular asperities. *Fins*—dorsal situated in the last third of the distance between the head and base of caudal fin, elevated in front, and its middle and last rays also rather elongated. Pectoral rather longer than the body is high. Ventral situated midway between the front edge of the eye and the base of the caudal. Anal commences very slightly in advance of the dorsal, and is of somewhat similar shape. Caudal lobed, lower lobe the longer. *Scales*—thin and small (350 rows, Bleeker), some present on the preopercle. Free portion of the tail tetrahedral, rather higher than broad. *Lateral-line*—forming a badly developed keel on the side of the free portion of the tail. *Colours*—upper surface of the head and back green, with steel-blue reflections minutely dotted with black, fading into silvery-white on the abdomen. The side of the upper jaw of a dark olive, of the lower silvery. A black line passes from the upper third of the angle of the mouth along the base of the teeth. Cheeks and opercles silvery. Membranes of the dorsal, caudal, and pectoral fins of a light greenish-gray, minutely dotted with black, especially at their margins. Anal and ventral anteriorly white, dotted with black. Iris silvery, the margin of the orbit black. In young specimens the colours vary, the upper surface is more of a yellowish-green, there is a large black spot on the opercle, and the lower jaw is also black: a narrow silvery greenish band passes longitudinally above the lateral-line. The upper portion of the dorsal is black, and the centre of the caudal is stained blackish.

Russell's figure appears to represent either *B. choram* or *B. annulata*, both of which are found on the Coromandel coast of India. Bleeker considers it to be *Belone* or *Mastacembelus melanotus*, Bleeker.

Habitat.—Red Sea, seas and estuaries of India, Malay Archipelago, China, and North Australia. Grows to at least 2 feet in length.

3. **Belone choram**, Plate CXVIII, fig. 4.

Esox choram, Forsk. Desc. Anim. p. 67.
Belona crocodila, Les. J. Acad. Nat. Sc. Phil. 1821, p. 129.
Belone choram, Rüpp. N. W. Fische, p.72; Günther, Catal. vi, p. 239; Klunz. Verh. z. b. Ges. Wien, 1871, p. 579.
Belone crocodilus, Cuv. and Val. xviii, p. 440.

B. x, D. 22-23, P. 14, V. 6, A. 19-20, C. 18.

Length of head $3\frac{1}{3}$ to $3\frac{1}{2}$, of caudal 9, height of body 12 to 14 in the total length. *Eyes*—diameter 2 in the postorbital length of the head, and from $1\frac{1}{4}$ to $1\frac{1}{2}$ diameters apart. A wide shallow groove exists along the summit of the head, superciliary region striated, maxilla concealed by the preorbital. The height of the head equals half its length behind the front edge of the eyes. *Teeth*—none on the vomer. *Fins*—dorsal commences in the posterior 1/3 of the length of the body, its hind rays reach nearly or quite the base of the caudal. Pectoral as long as the head behind the middle of the eyes. Ventral inserted midway between the front edge of the eye and the base of the caudal fin. Anal of the same character as the dorsal. Caudal forked, lower lobe the longer. Free portion of tail nearly as wide as high. *Scales*—absent from the opercles, some on groove on head. 25 rows between the lateral-line and the base of the dorsal fin. *Lateral-line*—forming a narrow keel along the side of the free portion of the tail. *Colours*—bluish-green superiorly, becoming lighter below: a silvery stripe along the side: upper edge of dorsal and pectoral fins usually black.

Habitat.—From the Red Sea and East coast of Africa, through the seas of India to the Malay Archipelago.

4. Belone leiurus.

Bleeker, Nat. Tyds. Ned. Ind. i, p. 94, Snoek, Vissch. p. 13; Kner. Novara Fische, p. 321; Günther, Catal. vi, p. 250.

Belone tenuirostris, Blyth, Proc. As. Soc. of Bengal, 1858, p. 287.

Mastacembelus anastomella, Bleeker, Nat. Tyds. Dierk. iii, p. 224, (not C. V.)

Mastacembelus leiurus, Bleeker, Atl. Ich. vi, p. 46, Scombres, t. xi, f. 2.

B. x, D. 19, P. 11, V. 7, A. 22-24, C. 17.

Length of head 3 to $3\frac{1}{5}$, of caudal 15, height of body 14 in the total length. *Eyes*—3 diameters in the postorbital length of the head, $1\frac{1}{4}$ apart. A wide shallow groove on the head, broadest anteriorly. Superciliary and parietal regions striated. *Teeth*—vomerine ones absent: tongue smooth. *Fins*—ventral arises midway between the posterior margin of the preopercle and the base of the caudal fin: pectoral nearly as long as the postorbital portion of the head, and one-third longer than the body is high: dorsal commences considerably behind the anal, its anterior rays the highest: upper surface of the fin concave. Anterior anal rays the longest: fin inferiorly concave: its last ray, when laid flat, extends one-third of distance to the base of the caudal which is rounded. *Scales*—small over body and cheeks: 12 rows between the lateral-line and base of the dorsal fin. Free portion of tail compressed, higher than wide, without any distinct lateral keel. *Colours*—bluish-green, becoming light on the sides and beneath, with a silvery lateral band: the posterior half of the pectoral dark, as is also the lower half of the caudal fin.

Habitat.—Seas of India to the Malay Archipelago.

5. Belone cancila, Plate CXVIII, fig. 5.

Esox cancila, Ham. Buch. Fish. Ganges, pp. 213, 380, pl. 27, f. 70.

Belone Graii, Sykes, Trans. Zool. Soc. 1841, p. 367, t. 63, f. 4; Bleeker, Beng. p. 72; Jerdon, Madras J. L. and Sc. 1849, p. 345.

Belone cancila, Cuv. and Val. xviii, p. 455; Bleeker, Verh. Bat. Gen. xxv, p. 145; Day, Fish. Malabar, p. 166; Günther, Catal. vi, p. 253.

B. x, D. 15-18 ($\frac{2-3}{13-15}$), P. 11, V. 6, A. 16-18 ($\frac{2-3}{14-16}$), C. 15.

Length of head $2\frac{2}{3}$ to $2\frac{3}{4}$, of pectoral 12, of caudal 10, height of body 8 to 12 in the total length. *Eyes*—3 to $3\frac{1}{6}$ diameters from the hind edge of the opercle, and 1 apart. A deep longitudinal groove along the upper surface of the head. Lower jaw the longer: the maxilla, which is partially concealed by the preorbital, reaches to beneath the first-third of the eye. Supraorbital margin smooth: preopercle rather broader than high. *Teeth*—a row of large, sharp, widely separated ones in both jaws, with an external row of numerous fine ones, none on the vomer. *Fins*—dorsal commences opposite the anal, and is rather more than, or else twice as far from the anterior extremity of the orbit as it is from the posterior extremity of the tail. Pectoral equals half the distance of the head behind the front edge of the eye. Ventral is inserted rather nearer the base of the caudal than the hind edge of the eye. Caudal slightly emarginate. The last dorsal and anal rays not elongated. *Scales*—small over the body and in irregular rows, some over front end of groove on head, also on sides of head except opercles. About 30 rows between the commencement of the dorsal fin and the lateral-line in Punjab, Assam, Burmese, and Orissa specimens, about 25 in those from lower Bengal, and 20 to 22 in those from Madras and the Malabar coast. Free portion of the tail compressed, higher than thick. *Colours*—greenish-gray superiorly, becoming whitish along the abdomen: a silvery streak having a dark margin extends along the body from opposite the orbit to the centre of base of caudal fin. The whole upper two-thirds of the body is closely marked with fine black spots; while there are from 4 to 5 larger blotches along the side between the bases of the pectoral and anal fins, these are absent in the young. Dorsal and caudal posteriorly tipped darker: anal whitish with a grayish margin. Eyes golden.

There is a variety at Hurdwah and in the central Provinces, having a hump along the first part of its back, sometimes continued as an elevated ridge as far as the origin of the dorsal fin.

Habitat.—Fresh waters of Sind, India, and Ceylon, also through Burma.* It attains at least 12 inches in length.

6. Belone strongylurus, Plate CXVIII, fig. 6.

Esox, Russell, Fish. Vizag. ii, p. 61, and *Kuddera*, A. Plate 176.

Belone strongylura, V. Hasselt, Bulletin de De Ferussac, 1823, Zool. p. 374; Günther, Catal. vi, p. 246.

Belone caudimaculata, Cuv. Rég. Anim.; Cuv. and Val. xviii, p. 452; Rich. Ich. China, p. 264; Bleeker, Snoek, p. 12, and Beng. p. 72; Cantor, Catal. p. 246; Jerdon, M. J. L. and Sc. 1851, p. 147; Day, Fish. Malabar, p. 164; Günther, Catal. vi, p. 245.

Mastacembelus strongylurus, Bleeker, Revis. Mastacem. p. 220, Atl. Ich. vi, p. 45, and Scombresoc. t. xi, f. 3.

Cungur, Sind.: *Ooshee-collarchee* and *Coco-meen*, 'Long-nosed fish," Tam.: *Wodlah-muku*, Tel.: *Thook-o-doo-noo-dah*, Andam.: *Coplah*, Mal.

B. xii, D. 13-15, P. 11, V. 6, A. 16-18, C. 15.

Length of head $2\frac{2}{3}$ to 3, of caudal 10, height of body 13 to 14 in the total length. *Eyes*—diameter $3\frac{1}{2}$ in the postorbital length of the head, 1 to $1\frac{1}{4}$ apart. A shallow median groove along the head, the superciliary region scarcely striated. One-third of the maxillary concealed by the preorbital. Preopercle wide: opercle rounded posteriorly. *Teeth*—in the jaws widely separated, sharp, straight, not very large. Vomerine teeth absent. *Fins*—ventral arises midway between the orbit and the base of the caudal fin: anal in the last third of body, its first 4 rays in advance of the dorsal, which last is highest in front, with the upper margin concave, its posterior rays do not extend nearly to the root of the caudal fin: anal of the same shape. Pectoral nearly as long as the postorbital portion of the head. Caudal rounded. *Scales*—small, on the opercles and groove on the head: 11 transverse rows between the lateral-line and base of the anterior rays of the dorsal fin. *Lateral-line*—double. The free portion of the tail compressed, much deeper than wide and without any distinct lateral keel. *Colours*—summit of head and back yellowish-green, with minute brown dots, fading into silvery on the sides, and white on the abdomen. Cheeks and opercles silvery. A deep blue longitudinal band, bordered beneath by another broader one of silver, passes along the posterior half of the sides. Dorsal with a little orange along its upper edge, it and sometimes the anal bright yellow, and the rays dotted with brown. Pectoral and ventral diaphanous, the latter occasionally with a black spot at the base. Caudal yellowish or greenish, minutely dotted with black, and having a round bluish-black spot in the centre near the root. Iris silvery: upper surface of eye bluish-black.

Dr. Günther considers that *B. strongylurus* "is very closely allied to *B. caudimaculata*, but has always the head shorter and the eye comparatively smaller."

Habitat.—Seas and coasts of India and Burma to the Malay Archipelago. Sometimes it is taken in estuaries and tidal rivers, it is not uncommon at Calcutta. It attains 2 feet or more in length.

Genus, 2—HEMIRHAMPHUS,† *Cuv.*

Hyporhamphus, *Euleptorhamphus*, *Zenarchopterus*, and *Oxyporhamphus*, Gill.: *Dermatogenys* (K. and v. Hass.), Peters: *Hemirhamphodon*, Bleeker: *Arhamphus*, Günther.

Parl kollarchee, Tamil.

Branchiostegals rather numerous. Gill-openings wide. Body sub-cylindrical and elongated. Eyes lateral. Upper jaw, which is formed by the premaxillaries, is short and more or less triangular in form: whilst the lower jaw, in the mature, is elongated far beyond the upper. A nasal barbel usually present. Teeth villiform in both jaws. The number of dorsal and anal rays may be about equal, or either may be in excess of the other. The dorsal fin may commence anterior to, above, or behind the origin of the anal: no finlets posterior to the dorsal fin. Pectoral may or may not be prolonged: caudal mostly forked or emarginate, sometimes rounded. Scales of moderate, or large, size: air-vessel large, occasionally cellular. Dorsal and anal rays may be modified. Some species are viviparous. No pyloric appendages.

During the cold season of the year the roes of these fishes are largely collected on the Malabar coast of India, where they are esteemed a great delicacy.

* It has been brought from Ta young by Dr. J. Anderson.

† The *Hemirhamphinæ* have been thus sub-divided (see Bleeker's Atlas, vi, p. 51.)

I.—The portion of the lower jaw (beak) anterior to the conjoined premaxillaries, smooth and edentulous.

Beak rudimentary, not longer than the upper jaw. Caudal lobed, as *Oxyporhamphus*=*Arrhamphus*.

Beak much longer than the upper jaw. The dorsal fin commencing above or anterior to the anal, as 1. *Hemirhamphus*=*Hyporhamphus*. Body moderately elongate. Teeth in the jaws tricuspidate or conical. Caudal bilobed. 2. *Euleptorhamphus*. Body very elongate. Teeth in premaxillaries simple: tricuspidate in the lower jaw. Dorsal commencing above or anterior to the anal. Caudal bilobed. 3. *Zenarchopterus*. Body moderately elongate. Conical teeth in the jaws. Dorsal commencing above or anterior to the anal. Caudal not emarginate. The males may have one or more dorsal, or anal rays modified 4. *Dermogenys*. Body moderately elongate. Dorsal considerably shorter, and commencing far behind the origin of the anal. Caudal rounded. Teeth conical.

II.—The portion of the lower jaw (beak) anterior to the conjoined premaxillaries, toothed.

6. *Hemirhamphodon*. Body moderately elongated. Dorsal fin commencing far before the anal, and twice as long as it. Caudal rounded. Teeth conical.

In counting the scales of species of *Hemirhamphi* and *Exocœti*, those which exist in a straight line between the head and base of the caudal fin are enumerated and not those along the lateral-line, consequently the letters L. r. or lateral rows are employed. Deformed specimens are frequently met with in which the beak has been injured. Bleeker observes, "the length of the lower jaw in the *Hemirhamphi* often varies considerably in the same species." It has yet to be proved whether the teeth in some species may not vary with age.

SYNOPSIS OF SPECIES.

A.—*Pectorals long.*

1. *Hemirhamphus longirostris*, D. 21-22, A. 18-20. A silvery band. Coromandel coast of India.

B.—*Pectorals short.*

2. *Hemirhamphus leucopterus*, D. 18 (16), A. 15 (14). Beak $4\frac{1}{2}$ in the total length. Ventral in last third of distance between eye and base of caudal fin. No scales on dorsal or anal fins. Bombay.

3. *Hemirhamphus Cantori*, D. 15-16, A. 15, L. r. 62. Beak $3\frac{2}{3}$ in the total. Ventral fin inserted in the commencement of the last third of the distance between the front edge of the premaxillaries and base of caudal fin. Some scales on anal fin. Seas of India to the Malay Archipelago and China.

4. *Hemirhamphus xanthopterus*, D. 14-15, A. 16-17, L. r. 56-58. Beak red tipped and 7 to $7\frac{1}{2}$ in the total length. Ventrals inserted midway between hind edge of eye and base of caudal fin. Very few, if any, scales on dorsal or anal fins. Malabar coast of India.

5. *Hemirhamphus unifasciatus*, D. 15-16, A. 15-17, L. r. 52-58. Beak $6\frac{3}{4}$ in the total length. Ventral inserted midway between front edge of eye and base of caudal fin. Seas of India to the Malay Archipelago and beyond.

6. *Hemirhamphus Reynaldi*, D. 14-15, A. 14-15, L. r. 52-54. Beak $6\frac{1}{3}$ in the total length. Eye equal to length of postorbital portion of the head. Ventral inserted rather nearer base of caudal than that of pectoral. East coast of Africa, seas of India to the Malay Archipelago.

7. *Hemirhamphus Georgii*, D. 14-15, A. 13-14, L. r. 58. Beak $4\frac{2}{3}$ to $4\frac{3}{4}$ in the total length. Ventral inserted in last third of distanee between angle of mouth and base of caudal fin. No scales on dorsal or anal fins. Seas of India to the Malay Archipelago.

8. *Hemirhamphus far*, D. 13-14, A. 10-12, L. r. 50-54. Beak 5 to $5\frac{4}{5}$ in the total length. Ventral inserted in last third of the distance between the middle of the eye and base of the caudal fin. A few seales on dorsal and anal fins. Four dark vertical blotches along the side. Red Sea, East coast of Africa, seas of India to the Malay Archipelago and beyond.

9. *Hemirhamphus limbatus*, D. 13-14, A. 13-15, L. r. 50-52. Beak $6\frac{1}{3}$ to $6\frac{1}{2}$ in the total. Ventral inserted midway between eye and base of caudal. Seas of India to Burma.

10. *Hemirhamphus Buffonis*, D. 14, A. 10-12, L. r. 42. Beak $3\frac{1}{9}$ to $3\frac{1}{2}$ in the total length. Some of the vertical rays modified. Ventral inserted in the last third of the distanee between the eye and base of the caudal fin, which is rounded. Seas of India to the Malay Arehipelago.

11. *Hemirhamphus ectunctio*, D. 13-14, A. 10-12, L. r. 46-48. Beak $5\frac{1}{2}$ in the total length. Ventral inserted in last third of distance between eye and base of the caudal fin, which latter is rounded. End of upper jaw white. From the Hooghly to the Malay Archipelago.

12. *Hemirhamphus dispar*, D. 11-12, A. 11-12, L. r. 40. Beak $4\frac{1}{4}$ in the total. Ventral inserted in the last third of the distance between the end of the upper jaw and base of eaudal fin, which latter is rounded. Some of the anal rays modified. Seas of India to the Malay Arehipelago.

13. *Hemirhamphus brachynopterus*, D. 9, A. 15. Beak $4\frac{2}{3}$ in the total. Caudal rounded. Hooghly.

1. Hemirhamphus longirostris.

Esox, Russell, Fish. Vizag. ii, p. 62, and *Kuddera*, C, plate 178.
Hemirhamphus longirostris, Cuv. Règ. Anim.; Cuv. and Val. xix, p. 52; Günther, Catal. vi, p. 276.

D. 21-22, P. 8, V. 6, A. 18-20, C. 26.

Length of head 3, of beak $4\frac{1}{2}$, of caudal $10\frac{1}{2}$, height of body 18 in the total length. *Eyes*—diameter $1\frac{1}{3}$ in the postorbital length of the head, and nearly 1 apart. Body narrow and compressed. Preorbital rather longer than high. Upper jaw eonvex in both directions and 1/4 wider at its base than it is long. *Teeth*—small, and numerous. *Fins**—dorsal, anteriorly much elevated, it commenees somewhat anterior to the origin of the anal. Pectoral $3\frac{2}{3}$ in the length of the body, its upper ray broad and compressed. Ventrals very small, 1/6 the length of the pectoral. Caudal deeply forked, lower lobe the longer. *Colours*—a silvery lateral band, the fins with dark outer margins.

Habitat.—Coromandel eoast of India. It attains to at least 10·5 inches in length.

* In the type specimen at Paris the fins are now much injured, whilst the scales cannot be counted. In Russell's figure the ventrals are shown as inserted midway between the bases of the pectoral and caudal fins.

2. Hemirhamphus leucopterus.

Cuvier and Valenciennes, xix, p. 48.

D. 18 (16), P. 11, V. 6, A. 15 (14), C. 14.

Length of head $2\frac{1}{2}$, of beak $4\frac{1}{2}$, of caudal 9, height of body 12 in the total length. *Eyes*—diameter $1\frac{1}{3}$ in the postorbital length of the head, $1\frac{1}{4}$ diameters apart. Preorbital longer than high. Upper jaw slightly wider at its base than it is long, keeled, not scaled: no barbels. *Fins*—anal commences under the third dorsal ray. Ventral inserted in the commencement of the last third of the distance between the eye and base of the caudal fin. Lower lobe of caudal the longer, the central rays twice as long as the eye. *Scales*—none on dorsal or anal fins. *Colours*—a silvery lateral band: fins colourless: beak black.

Dussumier's specimen from which the foregoing description of *H. leucopterus* is drawn up, is not in a good state, some of the rays are broken and it is partly denuded of scales. It was said to be distinguished from *H. xanthopterus* by a much narrower head, a more slender and longer beak, and lower dorsal and anal fins.

Habitat.—Bombay.

3. Hemirhamphus Cantori, Plate CXIX, fig. 1.

? Hemirhamphus Russelli, Cuv. and Val. xix, p. 52 (not Cantor, Günther, or Bleeker).

Hemirhamphus longirostris, Bleeker, Batavia (not C. and V.)

Hemirhamphus Georgii, Bleeker, Snock, p. 19; Günther, Catal. vi, p. 264; Kner. Novara Fische, p. 323, (not Cuv. and Val.)

Hemirhamphus Cantori, Bleeker, Nat. Tyds. Dierk. iii, p. 145, and Atl. Ich. vi, p. 53, Scombrc. t. vi, f. 2; Günther, Catal. vi, p. 264.

B. xiv, D. 15-16, P. 10-12, V. 6, A. 15, C. 16, L. r. 62.

Length of head $2\frac{1}{3}$, of beak $3\frac{3}{5}$, of caudal 7, height of body 12 to 13 in the total length. *Eyes*—diameter $1\frac{2}{3}$ in the postorbital length of the head and $1\frac{1}{3}$ apart. Body compressed. Upper jaw pointed, 1/3 longer than wide and rather convex. Height of head equals its length behind the front 1/3 of the eye, and exceeds its width: no barbels. *Teeth*—one or two rows of (comparatively large) tricuspid ones in both jaws. *Fins*—dorsal fin commences anterior to the anal, its last rays when laid flat reach the base of the caudal. Pectoral rather longer than the head behind the front edge of the eye. Ventral inserted in the commencement of the last third of the distance between the front end or middle of the premaxillaries and the base of the caudal fin, which latter is forked, its lower lobe the longer, the central caudal rays equal the postorbital length of the head. *Scales*—none on dorsal fin but some on the anal: 6 rows between the lateral-line and base of dorsal fin. *Colours*—greenish-blue superiorly, having a burnished silvery stripe along the sides, which posteriorly is broader than a scale.

This is perhaps *H. Russelli*, C. V., which has D. 17, the beak flattened and nearly 1/4 *of the total length*. Cantor's species has the beak 1/6 *of the total length*, and cannot be the same as C. V.'s fish.

H. Georgii, Cantor, Catal. p. 248; Bleeker, Scomb. p. 45; Günther, Catal. vi, p. 264, differs in the anal fin being scaleless, but the specimens are young and in a bad state of preservation.

Habitat.—Bombay, Malabar, Madras and seas of India to the Malay Archipelago and China.

4. Hemirhamphus xanthopterus, Plate CXIX, fig. 2.

Cuv. and Val. xix, p. 47; Day, Fishes of Malabar, p. 168.

B. xii, D. 14-15, P. 13, V. 6, A. 16-17, C. 15, L. r. 56-58.

Length of head $3\frac{1}{2}$ to $3\frac{1}{3}$, of beak 7 to $7\frac{1}{2}$, of caudal $7\frac{1}{2}$, height of body 12 in the total length. *Eyes*—diameter $1\frac{1}{3}$ in the postorbital length of the head, and 3/4 to 1 diameter apart. Preorbital rather longer than high. Upper jaw rather longer than wide at its base. No barbels. *Teeth*—many rows of minute tricuspidate ones in both jaws. *Fins*—anal commences opposite the dorsal, the anterior portion of both rather elevated. Pectoral reaches the middle of the eyes. Ventral inserted midway between the hind edge of the eye and the base of the caudal. Lower caudal lobe the longer, its central rays as long as the postorbital portion of the head. *Scales*—with some circular lines on each parallel with the outer margin, so that the edges appear rather raised; none on dorsal or anal fins, or a few very fine ones on their anterior portion: 7 rows between lateral-line and base of dorsal fin. *Colours*—a brilliant lateral band 2/3 as wide as a scale in its widest part. End of beak coral red.

This fish is very similar to *H. Gamaidi*, but has a longer triangular upper jaw and more scales. *H. Reynaldi* has its ventral in a different situation. *H. unifasciatus* has its dorsal and anal fins scaled.

Habitat.—Malabar coast of India.

5. Hemirhamphus unifasciatus.

Ranzani. Nov. Comm. Acad. Sc. Inst. Bonon. v, 1842, p. 326, t. 25; Günther, Catal. vi, p. 262; Bleeker, Atl. Ich. vi, p. 59.

Hemirhamphus Richardi, Cuv. and Val. xix, p. 26.

Hemirhamphus tricuspidatus, Gill, Proc. Acad. Nat. Sc. Phil. 1859, p. 131.
Hemirhamphus neglectus, Bleeker, Nat. Tyds. Dierk. iii, p. 157, and Atl. Ich. Scomb. t. viii, fig. 5.

B. x, D. 15-16, P. 12, V. 6, A. 15-17, C. 16, L. l. 52-58.

Length of head $3\frac{1}{4}$, of beak $6\frac{3}{4}$, of caudal $7\frac{1}{2}$, height of body $11\frac{1}{2}$ in the total length. *Eyes*—diameter $1\frac{1}{2}$ in the postorbital length of the head, and $1\frac{1}{4}$ apart. The height of the head equals its length behind the middle of the eyes. *Teeth*—many fine ones in both jaws. *Fins*—pectoral when laid forwards reaches the front edge of the eye. Dorsal commences in the last fourth of the distance between the angle of the mouth and base of the caudal fin. Ventral inserted midway between the base of the caudal fin and the front edge of the eye. Caudal forked, lower lobe the longer, the length of the central rays $1\frac{1}{3}$ diameters of the eye. *Scales*—present on dorsal and anal fins: $5\frac{1}{2}$ to 6 rows between the base of the dorsal fin and the lateral-line. *Colours*—bluish, with a rather narrow silvery band.

Habitat.—Malabar, Andamans, to the Malay Archipelago and beyond.

6. Hemirhamphus Reynaldi.

Cuv. and Val. xix, p. 39; Day, Fish. Malabar, p. 167.
Hemirhamphus Dussumieri, (not Cuv. and Val. xix, p. 33) Bleeker, Snoek, p. 18, Revis. Hemirh. p. 150, and Atl. Ich. vi, p. 56, Scomb. t. vii, f. 3; Günther, Catal. vi, p. 266; Kner, Novara Fische, p. 322.

B. xiii-xiv, D. 14-15 (16), P. 11, V. 6, A. 14-15 (17), C. 15, L. r. 52-54.

Length of head $3\frac{1}{5}$, of beak $6\frac{1}{3}$, of caudal $6\frac{1}{3}$, height of body 11 to 13 in the total length. *Eyes*—diameter equals the postorbital length of the head, and also the width of the interorbital space. Preorbital rather longer than high. Upper jaw keeled, scaled, rather broader at its base than it is long. No barbels. Body nearly as wide as high. *Teeth*—numerous fine rows of tricuspid ones in the jaws. *Fins*—anal commences below the third or fourth dorsal ray. Pectoral reaches as far forwards as the middle or front margin of the eye. Ventral commences rather nearer the base of the caudal than that of the pectoral, or else midway. Caudal deeply forked, lower lobe the longer, its central rays as long as the eye. *Scales*—none on dorsal or anal fins. *Colours*—a silvery lateral band: upper edge of dorsal blackish.

The type of *H. Reynaldi*, C. V. brought by Reynald from Trincomalee is still in Paris, and it seems to be this species. *H. Dussumieri*, Bleeker and Günther, appears to have the eye too large, whilst the beak scarcely agrees with C. V. description.

Klunzinger, Fische d. R. M. Verh. z. b. Ges. Wien, 1871, p. 584, describes another species as *H. Dussumieri*, C. V., D. 14-15, A. 14-15, L. l. 52-54. Length of head 3, height of body ($10\frac{1}{2}$) 14, of beak 5, of caudal fin 8 in the total length. *Eyes*—$7\frac{1}{2}$ in length of head, and $1\frac{2}{3}$ in postorbital length. Body quadrilateral or rather higher than broad. *Teeth*—tricuspid. Pectoral twice as long as ventral, but does not quite equal height of body. Ventral inserted between base or last third or fourth of pectoral and base of caudal. Lower caudal lobe somewhat the longer, its middle rays shorter than the eye. *Scales*—sometimes numerous on dorsal and anal fins.

Habitat.—East coast of Africa, Seas of India to the Malay Archipelago.

7. Hemirhamphus Georgii, Plate CXX, fig. 2.

Cuv. and Val. xix, p. 37, pl. 555 (not Cantor, Catal. p. 248; Jerdon, M. J. L. and Sc. 1851, p. 147; Günther, Catal. vi, p. 264; Bleeker, Atl. Ich. vi, p. 54; Kner, Novara Fische, p. 323).
Hemirhamphus marginatus, Bleeker, Ned. Tyds. Dierk. iii, p. 148, and Atl. Ich. vi, p. 54, Scom. t. viii, f. 4; Günther, Catal. vi, p. 470 (*? Esox marginatus*, Forsk. &c.)
Hemirhamphus plumatus, Blyth. Proc. As. Soc. of Bengal, 1858, p. 288.

B. xii, D. 14-15 (16-17), P. 11, V. 6, A. 13-14, C. 16, L. l. 54-58.

Length of head $2\frac{3}{4}$, of beak $4\frac{2}{3}$ to 5, of caudal $7\frac{1}{3}$ to 8, height of body 10 to 13 in the total length. *Eyes*—diameter $1\frac{1}{2}$ to $1\frac{2}{3}$ in the postorbital length of the head, $1\frac{1}{4}$ diameters apart. The height of the head equals its length behind the middle of the eyes. Upper jaw about equalling one diameter of the eye in length, rather pointed and a little longer than wide at its base, convex, scarcely keeled and not scaled. Preorbital slightly longer than high. *Teeth*—in few rows in both jaws, most are pointed, but there are a few tricuspidate ones intermixed. *Fins*—dorsal commences in the last fourth of the distance between the front edge of the eye and the base of the caudal fin and a little anterior to the anal. Pectoral reaches the middle of the eye. Ventral inserted in the commencement of the last third of the distance between the angle of the mouth and the base of the caudal fin. Length of base of anal 2/3 that of the dorsal. Caudal deeply forked, its central rays as long as about one diameter of the eye. *Scales*—none on dorsal or anal fins: 5 rows between lateral-line and base of dorsal fin. *Colours*—a broad silvery stripe which below the dorsal fin is rather wider than a scale. Fringe on lower jaw black.

The artist has shown the depth of the body as too great in Plate cxx, f. 2.

Dussumier's specimen of *H. Georgii*, from Mahé, $11\frac{1}{2}$ inches long, is still preserved at Paris: it has D. 15, A. 14, L. r. 58. M. Leschenault's specimen of *H. brevirostris*, C. V. at Paris, is in a bad state. Length of head 3, of beak $4\frac{1}{4}$, of caudal $10\frac{1}{2}$, height of body 18 in the total length. *Eyes*—diameter $1\frac{1}{3}$ in the postorbital length of the head, and nearly 1 apart. Preorbital rather longer than high. Upper jaw convex in both directions, 1/4 wider at its base than it is long. *Fins*—anal commences slightly behind the dorsal.

Klunzinger observes that *H. marginatus*, Forsk., has D. 13, A. 12, length of head 3, beak 5 in the total length: and fine deciduous scales on the dorsal and anal fins and is the same as Russell's figure.

Habitat.—Seas of India to the Malay Archipelago.

8. Hemirhamphus far, Plate CXX, fig. 3.

Esox far, Forsk. Descrip. Anim. No. 98.

Esox marginatus, var. Bl. Schn. p. 393.

Hemirhamphus far, Rüpp. N. W. Fische, p. 74; Peters, Monats. Berlin Acad. 1855, p. 428; Bleeker, en Pisc. p. 157, Revis. Hemir. p. 146, and Atl. Ich. vi, p. 54; Klunz. Verh. z. b. Ges. Wien, 1871, p. 582.

Hemirhamphus Commersonii, Cuv. Rég. Anim.; Cuv. and Val. xix, p. 28; Bleeker, Snoek, p. 17, and Atl. Ich. Scomb. t. vi, fig. 3; Günther, Catal. vi, p. 271.

B. xii-xiv, D. 13-14, P. 12, V. 6, A. 10-12, C. 15, L. l. 50-54, Vert. 38/16.

Length of head $2\frac{3}{4}$ to 3, of beak 5 to $5\frac{1}{2}$, of caudal $5\frac{1}{2}$ to 6, height of body $8\frac{1}{2}$ to 12 in the total length. *Eyes*—diameter $1\frac{1}{2}$ in the postorbital length of the head, and 1 apart. Greatest width of body 1/2 to 2/3 of its height. Triangular portion of upper jaw much wider than long. *Teeth*—small, tricuspidate. *Fins*—dorsal commences considerably in advance of the anal. Pectoral reaches the front edge of the eye. Ventral inserted in the last third of the distance between the middle of the eye and the base of the caudal fin. Anal about 1/2 as long as dorsal. Caudal deeply forked, lower lobe the longer, central rays equal to about 1 diameter of the eye. *Scales*—a few on the front portion of the dorsal and anal fins. *Colours*—back dark bluish-green: a silvery lateral band, and four dark blotches or spots along the sides. *Air-vessel*—cellular.

Habitat.—Red Sea and East coast of Africa, through the seas of India to the Malay Archipelago and beyond. The specimen figured was from Madras. It is said to attain 15 inches in length.

9. Hemirhamphus limbatus, Plate CXIX, fig. 3.

Esox angulatus, Ham. Buch. MSS. c. fig.

Hemirhamphus limbatus, Cuv. and Val. xix, p. 44; Günther, Catal. vi, p. 272.

Hemirhamphus brachynopterus, Blyth, P. A. S. of Beng. 1858, p. 288 (not Bleeker).

Gongaturi, Ooriah.

B. x, D. 13-14, P. 10, V. 6, A. 13-15, C. 14, L. r. 50-52.

Length of head $3\frac{1}{6}$ to $3\frac{1}{4}$, of beak $6\frac{1}{3}$ to $6\frac{1}{2}$, of caudal 7, height of body 9 to 10 in the total length. *Eyes*—diameter $1\frac{1}{3}$ to $1\frac{2}{3}$ in the postorbital portion of the head, nearly 1 diameter apart. Preorbital 3/4 as long as the eye, and longer than high. Width of body 2/3 of its height. The height of the body equals its length behind the middle of the eyes, and its width equals its postorbital length. Upper jaw short, 1/2 wider at its base than it is long, and keeled along the mesial line. *Teeth*—minute, in many rows in both jaws and tricuspidate. *Fins*—dorsal commences very slightly in advance of the anal, both fins having their outer edges concave. Pectoral reaches forward to the front edge of the eyes. Ventral inserted about midway between the eye (sometimes rather nearer the caudal) and base of caudal. Base of anal slightly shorter than that of the dorsal. Caudal lobed, the lower the longer, the central rays equalling $1\frac{1}{2}$ diameters of the orbit in length. *Scales*—5 rows between the base of the dorsal and the lateral-line. None on dorsal or anal fins, unless a few fine ones over their first portions. *Colours*—a brilliant silvery lateral band, which posteriorly becomes as broad as one scale. Dorsal, anal, and extremity of caudal sometimes stained blackish.

The foregoing is identical with the specimen of *H. limbatus*, Cuv. and Val. (6 inches long) brought from Pondicherry by M. Leschenault, and still in the Museum at the Jardin des Plantes at Paris. Cantor's specimens of *H. tridentifer* are skins* in a very bad state, and probably *H. Gamaidi*, C. V.

Habitat.—This is by far the most common species off the Coromandel coast of India, and extends to Burma: it is also found, but more rarely, on the Malabar coast. It ascends tidal rivers, and may be captured in fresh waters.

10. Hemirhamphus Buffonis, Plate CXIX, fig. 4.

Cuv. and Val. xix, p. 48; Bleeker, Nat. Tyds. Ned. Ind. iii, p. 711; Günther, Catal. vi, p. 273.

Hemirhamphus striga, Blyth, Pro. Asiatic Soc. of Beng. 1858, p. 288, (not C. V.)

Zenarchopterus Buffoni, Bleeker, Revis. Hemir. p. 162, Atl. Ich. vi, p. 62, and Scomb. t. vii, f. 4.

Hemirhamphus cirrhatus, Day, Proc. Zool. Soc. 1873, p. 709.

Koo-door-rock-o-dah, Andamanese.

B. xi, D. 14, P. 10, V. 6, A. 10-12, C. 13, L. r. 42.

Length of head $2\frac{1}{9}$ to $2\frac{1}{2}$, of caudal 9, of beak $3\frac{1}{9}$ to $3\frac{1}{2}$, height of body $8\frac{1}{2}$ to 9 in the total length. *Eyes*—diameter $1\frac{1}{2}$ in the postorbital extent of the head, $1\frac{1}{4}$ apart. Upper jaw 1/4 wider at its base than it is

* Cantor's types (skins) are as follows:—No. 1, Length to base of tail 4·8 inches, of base of dorsal fin $0{\cdot}5\frac{1}{4}$ inches, of base of anal $0{\cdot}5\frac{1}{4}$ inches, beak $6\frac{1}{4}$ in the total length. No. 2, 5·8 inches to base of tail, of base of dorsal fin $0{\cdot}7\frac{1}{4}$ inches, beak $6\frac{1}{4}$ in the total length.

Günther's specimen in spirit is 5·8 inches to base of tail, of base of dorsal fin $0{\cdot}7\frac{1}{4}$, of base of anal 0·7 inches.

long. A barbel at the posterior nostril 1/2 the length of the eye. *Teeth*—conical in both jaws. *Fins*—dorsal with a rather oblique upper edge. Pectoral, if turned forwards, reaches the middle or the front edge of the eye. Ventral small, inserted in the commencement of the last third of the distance between the eye and base of the caudal fin. Anal commences under the third or fourth dorsal ray, and the length of its base is from 1/2 to 1/3 as long, some of its rays are sometimes thickened. Caudal rounded, its lower rays very slightly produced. *Scales*—on upper jaw, none on the vertical fins. *Colours*—a narrow silvery streak along the side which below the base of the dorsal fin becomes nearly one-third as wide as a scale is deep: upper half of dorsal black.

Habitat.—Bombay, Hooghly, Andamans, waters of the Malay Archipelago and perhaps China. It ascends tidal rivers for some distance. It attains at least 8 inches in length.

11. Hemirhamphus ectunctio, Plate CXIX, fig. 6.

Esox ectunctio, Ham. Buch. Fish. Ganges, pp. 212, 380.
Hemirhamphus amblyurus, Bleeker, Snoek. p. 16; Günther, Catal. vi, p. 273.
Hemirhamphus Borneensis, Bleeker, l. c. p. 25.
Hemirhamphus ectunctio, Bleeker, Beng. p. 14; Blyth, Pro. Asi. Soc. of Beng. 1858, p. 287.
Hemirhamphus Bleekeri, Kner, Sitz. Akad. Wiss. Wien. 1860, p. 539, f. 4 (male.)
Hemirhamphus neglectus, Day, Proc. Zool. Soc. 1869, p. 526.
Zenarchopterus amblyurus, Bleeker, Ned. Tyds. Dierk. iii, p. 160, and Atl. Ich. vi, p. 61, Scom. t. iv, f. 1.

Nga-phoung-yo, Burmese.

B. x, D. 13-14, P. 9, V. 6, A. 10-12, C. 15, L. l. 46-48.

Length of head $2\frac{1}{2}$ to $2\frac{3}{4}$, of beak $5\frac{1}{2}$, of caudal 8 to 9, height of body 11 in the total length. *Eyes*—$2\frac{1}{4}$ to $2\frac{1}{2}$ diameters in the postorbital length of the head, and $1\frac{1}{4}$ apart. Head and body compressed: height of head equals its postorbital length. Upper jaw twice as long as broad at its base. Upper surface of the head flat. A short barbel, which is sometimes absent, at the nostril. *Teeth*—in jaws fine and conical. *Fins*—the dorsal commences somewhat anterior to the anal. Pectoral if laid forwards reaches the hind edge of the eye. Ventral inserted in the commencement of the last third of the distance between the eye and base of the caudal fin: it reaches 1/2 way to the anal. Anal rays thickened in the male. Caudal rounded. *Scales*—on upper jaw, none on vertical fins. *Colours*—of a dull greenish brown, with a narrow and indistinct lateral band: end of upper jaw milk white.

It is curious to observe these fish in tidal rivers, they swim near the surface, with their milk-white upper jaw generally visible.

Habitat.—Hooghly, tidal stream at Akyab, Burma, Siam, and to the Malay Archipelago. It attains at least 6 inches in length.

12. Hemirhamphus dispar, Plate CXIX, fig. 5.

Cuv. and Val. xix, p. 58, p. 558; Bleeker, Nat. Tyds. Ned. Ind. vi, p. 498; Günther, Catal. vi, p. 274; Peters, A. Ak. Berl. 1871, p. 32.

Zenarchopterus dispar, Gill, Pro. Acad. Nat. Sc. Phil. 1863, p. 273; Bleeker, Revis. Hemir. p. 164, Atl. Ich. vi, p. 63, and Scomb. t. vii, f. 4.

B. x-xi, D. 11-12, P. 10, V. 6, A. 11-12, C. 15, L. l. 40.

Length of entire head $2\frac{1}{3}$ to $2\frac{1}{2}$, of beak $4\frac{1}{4}$, of caudal 9, height of body 11 in the total length. *Eyes*—diameter $1\frac{1}{3}$ in the postorbital length of the head, and $1\frac{2}{3}$ apart. Upper jaw as broad at its base as it is long. A nasal barbel 2/3 as long as the eye. *Fins*—dorsal commences about 3 rays anterior to the origin of the anal, one of its rays may be modified. Pectoral as long as the head behind the front edge of the eye. Ventral inserted in the commencement of the last third of the distance between the end of the upper jaw and the base of the caudal fin. Anal with some of its rays, especially the sixth and sometimes the seventh, much thickened and elongated. Caudal cut square or slightly rounded. *Scales*—none on dorsal or anal fins: present on upper jaw. *Colours*—a silvery band along the side.

Habitat.—Seas of India to the Malay Archipelago and beyond. Common at the Andamans in protected bays.

13. Hemirhamphus brachynopterus.

Bleeker, Beng. en Hind. p. 146; Günther, Catal. vi, p. 275.

D. 9, A. 15, C. 16.

Length of head $3\frac{1}{4}$, of beak $4\frac{2}{3}$, of caudal 8, height of body 12 in the length of the body. *Eyes*—2 diameters in the postorbital length of the head, rather above 1 apart. Body elongated and compressed, a little higher than wide. Upper jaw rather wider than long, its length not equalling one diameter of the orbit. Upper surface of head flat. *Fins*—first ray of the dorsal over the fifth of the anal, length of the base of the anal not quite twice as long as that of the dorsal. Anal not lower than the body, its inferior edge concave. Caudal rounded.

Habitat.—River Hooghly, from whence Dr. Bleeker received a single small specimen, which unfortunately is now in such a bad state that I cannot add anything to the above description.

Genus, 3—Exocœtus, *Artedi.*

Cypsilurus, Swains. : *Halocypselus*, Weinland. : *Parexocœtus*, Bleeker.

Body moderately oblong. Gill-openings very wide. Jaws short : the premaxillaries and maxillaries separate. Mandible in some species with a tubercular prolongation. Barbels present or absent. Teeth, when present, minute and rudimentary. Pectorals elongated, used as an organ for flying : the dorsal fin may be much or only moderately elevated : ventrals long, short, or of moderate length. Air-vessel large. Pyloric appendages absent.

Genus *Parexocœtus*, Bleeker, was instituted for the reception of those species (as *E. mento*, C.V.) which have no barbels, but the lower jaw with a short tubercular prolongation as if an indication of an aborted attempt at the elongation seen in *Hemirhamphi*. Teeth in both jaws, vomer, palatines, tongue and pterygoids.

As many species of flying-fish are only known from young specimens, the size of the eye, and the length of the fins as given in descriptions must be accepted with a reservation, in fact it is necessary that the length of the specimen should be recorded. Barbels in some species may be an indication that the fish is immature, so may likewise vertical bands* on the body.

Geographical distribution.—Seas of temperate and tropical regions.

SYNOPSIS OF SPECIES.

1. *Exocœtus micropterus*, D. 15-16, A. 14-15, L. l. 50. A pair of barbels. Vertical fins low. Ventral midway between bases of pectoral and caudal fins. Malabar to the Malay Archipelago.

2. *Exocœtus pœcilopterus*, D. 12-14, A. 9-10, L. l. 54. Pectoral reaching base of caudal. Ventral long, it arises between head and base of caudal. Pectoral with black blotches. Seas of India to the Malay Archipelago.

3. *Exocœtus evolans*, D. 12-14, A. 13-15, L. l. 40-42. Pectoral reaches the base of the caudal. Ventral short, inserted nearer snout than base of the caudal. Tropical and intra-tropical seas.

4. *Exocœtus furcatus*, D. 13, A. 9-10. A pair of barbels at symphysis. Ventral inserted nearer caudal than front end of snout. Indian and Atlantic Oceans.

5. *Exocœtus Bahiensis*, D. 12-13, A. 9-10, L. l. 50. Ventral inserted midway between snout and posterior end of upper caudal lobe. Red Sea to the Malay Archipelago and beyond.

6. *Exocœtus mento*, D. 10-11, A. 10-11, L. l. 44. Lower jaw slightly produced at the symphysis. Ventral inserted midway between the front edge of eye and base of caudal fin. East coast of Africa, seas of India to the Malay Archipelago.

1. Exocœtus micropterus.

Cuv. and Val. xix, p. 127, pl. 563 ; Bleeker, Amb. p. 63, and Atl. Ich. vi, p. 77 ; Günther, Catal. vi, p. 279.

Cypsiluri micropteri, Bleeker, Exocœt. p.128, and Atl. Ich. vi, Scomb. t. iii, f. 1.

B. xiii, D. 15-16, P. 11-12, V. 6, A. 14-15, C. 15, L. l. 50.

Length of head $5\frac{1}{2}$, of caudal 5, height of body $7\frac{1}{2}$ in the total length. *Eyes*—diameter $3\frac{2}{3}$ in the length of the head, nearly 1 diameter from the end of snout. A pair of short barbels under the symphysis of the lower jaw, which is prominent. *Fins*—the dorsal commences a little anterior to the anal, and in the last fourth of the body, its rays are not prolonged, the highest scarcely exceeding $1\frac{1}{2}$ diameters of the orbit : upper edge of the fin rather convex. Pectoral not reaching so far as to the ventral, the latter, which is inserted midway between the base of the pectoral and caudal, not extending to the anal. Anal of the same shape as the dorsal. Lower caudal lobe the longer. *Colours*—bluish above : silvery on the sides and beneath : fins dark.

Habitat.—Malabar to the Malay Archipelago.

2. Exocœtus pœcilopterus, Plate CXX, fig. 4.

Cuv. and Val. xix, p. 112, p. 561 ; Günther, Catal. vi, p. 291 ; Bleeker, Atl. Ich. vi, p. 74, and Scomb. t. v, f. 5.

Parraray-kolah, Tamil.

D. 12-14, P. 14, V. 6, A. 9-10, C. 15, L. l. 54.

Length of head 5 to $5\frac{1}{3}$, of caudal $4\frac{3}{4}$ to $5\frac{1}{3}$, height of body $6\frac{1}{2}$ in the total length. *Eyes*—diameter $2\frac{3}{4}$ to 3 in the length of head, $\frac{1}{2}$ a diameter from end of snout, and 1 apart. The greatest height of the head equals its length excluding the snout, upper surface of the head roughened. Lower jaw the longer. *Barbels*—absent. *Fins*—dorsal commences some way in front of the anal, the height of its anterior rays 1/10 of the total length, the distance between the first dorsal ray and the base of caudal fin rather exceeds the length of the head, 30-32 scales between occiput and origin of the dorsal fin : ventral arises somewhat nearer the base of the caudal than

* Vertical bands in *Hemirhamphi*, and many of the *Scombresocidæ*, &c., are usually a sign that the species is immature.

to the hind edge of the head, and reaches to the end of the base of the root of the anal: the pectoral reaches as far as the end of the dorsal. *Scales*—7 rows between the base of the dorsal fin and the lateral-line. *Colours*—bluish along the back, becoming silvery on the sides and beneath. Pectoral with many rounded and oval spots, sometimes transversely arranged in bands, in others irregularly placed. Out of 3 specimens up to 13 inches in length, taken together at Madras, two had black spots upon the dorsal fin: ventral white or with spots.

Habitat.—Seas of India to the Malay Archipelago. The specimen figured (2/3 life-size) was from Madras.

3. Exocœtus evolans, Plate CXX, fig. 5.

Lin. Syst. Nat. i, p. 521; Linn. Gmel. p. 1400; Bloch, t. 398; Bl. Schn. p. 430, t. 84; Cuv. and Val. xix, p. 138; Gronov. ed. Gray, p. 145; Bleeker, Cape of Good Hope, p. 76, and Atl. Ich. vi, p. 69; Yarrell, Brit. Fishes, 3rd Ed. i, p. 474; Günther, Catal. vi, p. 282; Kner, Novara Fische, p. 326.

Exocœtus volitans, Lacépède, v, p. 401, t. xii, f. 2; Pennant, Brit. Zool. p. 441, t. 78; Donov. Brit. Fish. ii, p. 31; Brown, Phil. Trans. lxviii, p. 790, pl. 12; Yarrell, Brit. Fish. 2nd Ed. i, p. 453; Benn. Whaling Voyage, ii, p. 284.

Exocœtus splendens, Clarck, Abel, Journ. China, 1818, p. 4 (apud Günther).

Exocœtus volans, (Solander), Richardson, Ich. China, p. 264.

D. 12-14, P. 14, V. 6, A. 13-15, C. 17, L. l. 40-42, Vert. 25/19.

Length of head 5, of caudal 5, height of body 6 in the total length. *Eyes*—diameter $3\frac{1}{2}$ in the length of head, 3/4 of a diameter from the end of snout, and 1 apart. Interorbital space flat. The greatest height of the head equals its length anterior to the hind edge of the preopercle. Snout obtuse when the mouth is closed, rendering the two profiles equally convex. *Fins*—anterior dorsal rays not half so long as the head, the fin arises above or slightly in advance of the origin of the anal. Pectoral reaches to the base of the caudal. Ventral short, about 1/2 as long as the head, reaching 1/2 way to the base of the anal. Caudal lobed, the lower much the longer. *Scales*—$6\frac{1}{2}$ rows between the origin of the dorsal fin and the lateral-line. *Colours*—bluish along the back, becoming lighter on the sides and beneath. Pectoral gray or black and with a light edge.

Dr. Günther, Catal. vi, p. 283, has separated from this species as *E. obtusirostris*, a form from tropical and subtropical seas which "has the snout shorter and the head more elevated," one more abdominal vertebra and 7 rows of scales above the lateral-line.

Habitat.—Indian and tropical and sub-tropical seas, attaining at least 9 inches in length. The specimen figured (life-size) was from Bombay, it appears to be numerous at the Andamans.

4. Exocœtus furcatus.

Mitchell, Lit. and Phil. Trans. New York, i, p. 449, pl. v, f. 2; Günther, Catal. vi, p. 286.

D. 13, P. 13, V. 6, A. 9-10.

A pair of barbels at the symphysis of the lower jaw. *Fins*—dorsal moderately high, but its longest rays do not extend to the caudal. The ventrals reach the root of the caudal, and the pectorals nearly as far: the former fin arises slightly nearer the base of the caudal than to the anterior extremity of the snout. *Colours*—the posterior part of the ventrals and the lower part of the anal black. *Young* with three broad vertical bands across the anterior half of the abdomen: opercles and pectorals marbled with black: lower caudal lobe with three dark cross bands (Günther).

Habitat.—Indian and Atlantic Oceans. A small specimen, $2\frac{1}{2}$ inches in length, is in the British Museum, and reputed to have been brought from India.

5. Exocœtus Bahiensis, Plate CXXI, fig. 10.

Ranz. Nov. Com. Acad. Sc. Inst. Bonon. v, 1842, p. 362, t. 38; Günther, Catal. vi, p. 293; Bleeker, Atl. Ich. vi, p. 71; Klunz. Verh. z. b. Ges. Wien, 1871, p. 585.

Exocœtus vermiculatus, Poey, Mem. Cuba, ii, p. 300.

Exocœtus albidactylus, Gill, Proceed. Acad. Nat. Sc. Phil. 1863, p. 167.

Exocœtus spilonopterus, Bleeker, Exoc. p. 113, and Atl. Ich. Scomb. t. iii, f. 2.

B. xi, D. 12-13, P. 15, V. 8, A. 9-10, C. 19, L. l. 50.

Length of head $5\frac{1}{4}$, of caudal $4\frac{1}{2}$, height of body $6\frac{1}{4}$ in the total length. *Eyes*—diameter 1/3 of length of head, nearly 2/3 of a diameter from end of snout, and $1\frac{1}{4}$ apart. Interorbital space nearly flat. *Barbels*—absent. *Teeth*—rudimentary. *Fins*—dorsal commences between the front edge of the eye and the posterior extremity of the lower lobe of the caudal fin, its anterior rays 1/2 as long as the head. Ventral arises midway between front end of snout and end of upper caudal lobe, it reaches to the centre of the base of the anal. Pectorals reach to the end of the base of the dorsal. Anal commences below the last third of the dorsal fin. *Colours*—Dorsal sometimes with a dark mark on its summit: the pectoral darker than the remainder of the fins, and sometimes nearly black in its last third.

Habitat.—Red Sea, seas of India to the Malay Archipelago and beyond. The specimen figured (life-size) came on board one of the P. and O. steamers in the Red Sea.

6. **Exocœtus mento**, Plate CXXXI, fig. 9.

Cuv. and Val. xix, p. 124; Bleeker, Snoek. p. 21; Günther, Catal. vi, p. 281.

Parexocœtus mento, Bleeker, Exoc. p. 126, and Atl. Ich. vi, p. 77, Scombres, t. v, f. 6.

B. xi, D. 10-11, P. 13, V. 6, A. 10-11, C. 17, L. l. 44, L. tr. 6/2.

Length of head $4\frac{3}{4}$, of caudal 5, height of body $5\frac{1}{4}$ in the total length. *Eyes*—diameter $2\frac{2}{3}$ to 3 in the length of the head, about 1/2 a diameter from end of snout, and about 1 diameter from the hind edge of the opercle. Lower jaw a little the longer, slightly produced in the form of a tubercle at the symphysis: interorbital space smooth, with two grooves which diverge from the snout towards the occiput, ceasing opposite the middle of the orbit. No barbels. *Teeth*—villiform in both jaws, in several rows in the upper, only one in the lower: a large patch of villiform teeth in vomer, and also on the palatines. *Fins*—dorsal fin elevated as high as the body, and its membrane deeply cleft: 17 to 18 rows of scales between the occiput and origin of this fin, which commences opposite to or slightly before, the first anal ray. Ventrals in some specimens reaching to the anus, in others to the anal fin: the fin arises midway between the anterior edge of the orbit and the base of the caudal fin. Pectoral reaching to opposite the middle or end of the dorsal. Ventral does not quite reach the anal. Lower caudal lobe the longer. *Scales*—35 to 38 rows between posterior edge of head and base of caudal fin. *Colours*—bluish, becoming silvery along the abdomen: dorsal fin black: upper half of pectoral black, having a white edge: ventral white: anal white with a dark mark along its base: upper lobe of caudal white with a black bar along its base: lower lobe grayish.

Habitat.—Red Sea, East coast of Africa, seas of India to the Malay Archipelago. In the cold season it is occasionally numerous at Madras, but I never obtained it above 4·3 inches in length.

FAMILY, IV—CYPRINODONTIDÆ.

Branchiostegals from four to six: pseudobranchiæ absent. Eyes lateral. Margin of the upper jaw formed solely by the premaxillaries. Barbels absent. Teeth in both jaws, also in the superior and inferior pharyngeal bones. A single spineless dorsal fin situated in the posterior half of the body. Scales on head and body. Stomach without any blind sac. No pyloric appendages. Air-vessel simple, and destitute of a pneumatic duct.

This family has been sub-divided into :—*Cyprinodontidæ carnivoræ* having united mandibles and short intestines; and *C. limnophagæ* having separated mandibles and long intestines.

SYNOPSIS OF GENERA.

1. *Cyprinodon.* Mandibular bones united. Teeth in a single row.
2. *Haplochilus.* Mandibular bones united. Teeth in narrow bands. Anal fin more or less elongated.

Genus, 1—CYPRINODON, *Lacépède.*

Lebias, Cuvier: *Aphanius*, Nardo: *Micromugil*, Gulia.

Gape of mouth small: mandibles short and united at the symphysis. Teeth of moderate size, in a single compressed row, and notched at their summits. Origin of dorsal fin anterior to that of the anal, and largest in the male sex. Scales rather large. The colour of the sexes often different. Intestines of moderate length or rather short.

Geographical distribution.—Southern Europe, North Africa, Syria, Persia, along the shores of the Red Sea to Cutch.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Cyprinodon dispar*, D. 9, A. 10, L. l. 25-27, L. tr. 8. Grayish: the caudal fin in the males with dark semilunar vertical bands: narrow vertical bands on the body in the female. Cutch.

1. Cyprinodon dispar, Plate CXXI, fig. 1 (male), 2 (female).

Lebias dispar, Rüppell, Atl. Fische, p. 66, t. 18, f. 1 (male), 2 (female).
Cyprinodon lunatus, Cuv. and Val. xviii, p. 161.
Cyprinodon hammonia, Richardson, P. Z. S. 1856, p. 371 (not Cuv. and Val.)
Cyprinodon dispar, Günther, Catal. vi, p. 303 (not P. Z. S. 1859, p. 470); Klunz. Verh. z. b. Ges. Wien, 1871, p. 587.
Cyprinodon Stoliczkanus, Day, Journ. As. Soc. of Beng. 1872, p. 258.

B. iii, D. 9, P. 17, V. 7, A. 10, C. 15, L. l. 25-27, L. tr. 8.

Length of head $3\frac{3}{4}$ to 4, of caudal 5 to $5\frac{1}{2}$, height of body $3\frac{3}{4}$ to 4 in the total length. *Eyes*—diameter $3\frac{1}{4}$ in the length of the head, nearly 1 diameter from the end of snout, and $1\frac{1}{2}$ apart. Lower jaw somewhat the longer, the maxilla does not reach to below the front edge of the eye. *Teeth*—in a single tricuspid row in both jaws. *Fins*—dorsal elevated in the male, it commences midway between the middle of the eye and the base of the caudal fin, and above the tenth scale: whereas in the female it is not elevated and commences midway between the operele and base of the caudal. Ventral is also elongated in the males but not in the females. Caudal lunate. *Colours—Male:* greenish-yellow reticulated with darker, a small dark shoulder spot. Dorsal fin spotted, anal more sparingly so. Caudal yellowish, with a wide crescentic black band, having a white edge in its last half: another narrow one between it and the root of the caudal which is also dark. *Female:* silvery, with from seven to nine narrow vertical bands.

Ova very large, almost equalling the diameter of the eye. Length of the intestinal canal about three times that of the abdomen.

Habitat.—Abyssinia, Palestine, shores of the Red Sea, and common in Cutch, from whence Dr. Stoliczka brought 28 specimens.

Genus, 2—HAPLOCHILUS, *McClelland.*

Aplocheilus, McClelland: *Panchax*, Cuv. and Val.: *Zygonectes*, Agassiz: *Micristius*, Gill.

Branchiostegals from five to six. Body somewhat elongated and compressed. Upper surface of head and nape broad and depressed. Mandibular bones united at the symphysis. Teeth villiform in the jaws, present or absent on the palate. Dorsal fin short, commencing behind the origin of the anal, which latter has an elongated base. Scales cycloid and of medium size. Lateral-line absent. Intestinal canal of moderate length.

Bleeker restricts genus *Panchax* to those species possessing palatine teeth: and *Haplochilus* to those

destitute of such. Dr. Günther replies, "in one out of three specimens they are entirely absent." This latter statement is not in accordance with my numerous examples which show no such variation.

Geographical distribution.—India to the Malay Archipelago and beyond, Tropical Africa, Madagascar and Islands in the Indian Ocean, also temperate and tropical America. In India these fishes are mostly found in the neighbourhood of the sea or tidal rivers, more rarely very far inland.*

SYNOPSIS OF SPECIES.

1. *Haplochilus melastigma*, A. 20-24. Height of body $3\frac{3}{4}$ to 4 in the total. No teeth on vomer. India and Burma.
2. *Haplochilus rubrostigma*, A. 17-18, L. l. 33. Teeth on vomer. A prolonged ventral ray. Anal fin highest posteriorly. Spotted with red. Malabar and Madras.
3. *Haplochilus lineatus*, A. 15-17, L. l. 32-34. Teeth on vomer. A prolonged ventral ray. Anal fin of nearly even height. Vertical black bands. Malabar and Ceylon.
4. *Haplochilus panchax*, A. 15-17, L. l. 31-34. Teeth on vomer. No prolonged ventral ray. Orissa, Bengal, Burma, and Andamans to the Malay Archipelago.

1. Haplochilus melastigma, Plate CXXI, fig. 4.

Aplocheilus melastigma, McClelland, Ind. Cyp. pp. 301, 427, pl. 42, f. 3, and pl. 35, f. 4 (from H. B. MSS.)
Aplocheilus McClellandi, Bleeker, Cyprin. p. 487.
Aplocheilus Carnaticus, Jerdon, M. J. L. and Sc. 1849, p. 331.
Panchax cyanophthalmus, Blyth, Journ. As. Soc. of Beng. xxvii, 1858, p. 288, and 1860, p. 111.
Haplochilus cyanophthalmus, Günther, Catal. vi, p. 312.
Haplochilus argenteus, Day, Proc. Zool. Soc. 1867, p. 706.

B. iv, D. 6-7, P. 15, V. 6, A. 20-24, C. 15, L. l. 27, L. tr. 9-11.

Length of head $4\frac{1}{4}$, of caudal $4\frac{1}{2}$, height of body $3\frac{3}{4}$ to 4 in the total length. *Eyes*—diameter 3 in the length of head, 1 diameter from end of snout, and also apart. Lower jaw slightly the longer, the maxilla does not quite reach to below the front edge of the eye. *Teeth*—minute, none on the palate. *Fins*—dorsal inserted above the last fourth of the anal. Pectoral as long as the head. Ventral small, without any prolonged ray. Anal with in some (not all) examples its rays prolonged in a filiform manner beyond the membrane. Caudal rounded. *Colours*—of a dull green along the back becoming of a dull white on the abdomen, outer portion of anal rays white edged. A narrow dark line along the middle of the side terminating in a dull spot at the centre of the base of the caudal fin.

Pœcilia latipes, Schleg. Fauna Japon. p. 224, pl. cii, f. 5, appears very similar, but the caudal fin is given as emarginate, and the body is lower.

Habitat.—Wynaad, and Madras Presidency, Orissa, Lower Bengal and Burma. It attains about $1\frac{1}{2}$ inches in length.

2. Haplochilus rubrostigma, Plate CXXI, fig. 5.

Aplocheilus rubrostigma, Jerdon, M. J. Lit. and Sc. 1849, p. 331.
? *Aplocheilus affinis*, Jerdon, l. c.
Panchax rubrostigma, Day, Proc. Zool. Soc. 1867, p. 706.

B. iv, D. 8, P. 15, V. 6, A. 17-18, C. 15, L. l. 33, L. tr. 9.

Length of head $4\frac{3}{4}$; of caudal $5\frac{1}{2}$, height of body $5\frac{1}{2}$ in the total length. *Eyes*—diameter $3\frac{1}{4}$ in the length of head, $1\frac{1}{4}$ diameters from the end of snout, and $1\frac{1}{2}$ apart. Jaws of about the same length, the maxilla reaches to below the first third of the eye. *Teeth*—outer row in both jaws much enlarged, and recurved. *Fins*—dorsal inserted above the last few anal rays. Pectoral not quite so long as the head. Ventral with its second ray elongated and reaching to the middle of the anal fin. Anal much lowest anteriorly and increasing in length to the last ray. Central caudal rays rather prolonged. *Colours*—a silver occipital spot. Body reddish-brown superiorly, becoming yellowish on the sides and beneath. Each scale along the side with a central red spot. A row, sometimes two, of red spots along the base of the anal fin, some on the dorsal, and a few dark spots on the caudal.

Jerdon observes that *H. affinis* is very similar to *H. rubrostigma*, but "differs in the dorsal and caudal being nearly colourless, unspotted: and the anal being unspotted, orange. Having 16 anal rays instead of 14, being at the same time of less extent, body also not spotted. About 1·5 inches in length. Found in the same localities as *H. rubrostigma*."

Habitat.—Malabar coast of India, and the lower portion of the Coromandel coast. It attains to at least 3 inches in length.

3. Haplochilus lineatus, Plate CXXI, fig. 6.

Panchax lineatum, Cuv. and Val. xviii, p. 381; Bleeker, Beng. p. 72; Day, Fish. Malabar, p. 221.

* These fishes are termed *Kud-di-an* in Canarese: a white occipital spot is almost invariably present.

Aplocheilus vittatus, Jerdon, M. J. L. and Sc. 1849, p. 330.

B. v-vi, D. 8-9, P. 15, V. 6, A. 15-17, C. 19, L. l. 32-34, L. tr. 9.

Length of head $4\frac{1}{4}$, of caudal $4\frac{1}{3}$, height of body 5 to $5\frac{1}{4}$ in the total length. *Eyes*—diameter $3\frac{1}{2}$ in the length of head, $1\frac{1}{3}$ diameters from the end of snout, and $1\frac{1}{2}$ apart. Jaws of about the same length anteriorly, the maxilla reaches to below the first third of the eye. *Teeth*—outer row in lower jaw, the outer and innermost row in the upper jaw rather enlarged, and in a single row across the palate. *Fins*—dorsal inserted above the last few anal rays: pectoral nearly as long as the head. Second ventral ray elongated reaching to nearly the middle of the anal fin: anal high, the last rays about the same length as the anterior ones: central caudal rays rather prolonged. *Colours*—vary with the seasons and sex. Greenish with a gloss of purple on the cheek and along the abdominal surface. A golden green spot in the centre of each scale and also on the eye. Eight to ten vertical black bands pass down the sides to the abdomen. A black spot at the base of the dorsal, it, the caudal, and posterior half of the anal, with black or green spots, in some these fins are tipped with orange, in others they are darkish. In a Ceylon specimen in the British Museum (marked *H. panchax*) there are dark blotches and not distinct bars as seen in Malabar.

Habitat.—This species is found in Coorg and the Wynaad, down the Malabar coast and Ceylon. It attains 4 inches in length, and on the Western coast of India, is common in rivers, tanks, and paddy fields, and even in tidal waters. I have specimens as small as 1·2 inches in length, the bands are well marked, also the elongated ventral ray, whilst the caudal is much prolonged, and the height of the fish is 6 in the total length.

4. Haplochilus panchax, Plate CXXI, fig. 3.

Esox panchax, Ham. Buch. Fish. Ganges, pp. 211, 380, pl. iii, f. 69.

Aplocheilus chrysostigmus and *panchax*, McClelland, Ind. Cyp. pp. 301, 426, pl. 42, f. 2.

Panchax Buchanani, Cuv. and Val. xviii, p. 383; Bleeker, Beng. p. 72, and Atl. Ich. Cyp. p. 141, t. 43, f. 3; Blyth, Journ. As. Soc. Beng. 1858, p. 288.

Panchax Kuhlii, Cuv. and Val. xviii, p. 384.

Panchax panchax, Cantor, Catal. p. 252.

Panchax melanopterus, Bleeker, Oost Java, p. 23, Snoek, p. 23, and Beng. p. 144.

Haplochilus panchax, Günther, Catal. vi, p, 311.

Pang-chax, Beng.: *Kanakuri* and *Bor-ro-guddi*, Ooriah: *Nga-saki*, Mugh.: *Cho-to-dah*, Andamanese.

B. v-vi, D. 7-11, P. 15, V. 6, A. 15-17, C. 13, L. l. 31-34, L. tr. 9-10.

Length of head 4 to $4\frac{1}{3}$, of caudal 6, height of body $4\frac{3}{4}$ to 5 in the total length. *Eyes*—diameter $3\frac{1}{3}$ in the length of head, 1 diameter from the end of snout, and $1\frac{1}{2}$ apart. Lower jaw rather the longer: the maxilla reaches to below the first third of the eye. *Teeth*—with an enlarged outer row in the upper jaw: in a broad band on the vomer. *Fins*—dorsal inserted above the last anal rays. In Calcutta specimens it has 7 or 8, rarely more, rays: in those from the Andamans up to 11. Pectoral nearly as long as the head. Ventral small and without any elongated ray. Anal nearly square. Caudal rounded. *Colours*—A white occipital spot. Upper surface greenish, becoming dull white on the sides and beneath. Fins yellowish, the lower third of dorsal covered with a large black spot. Dorsal, caudal, and anal margined with orange.

Ova very large.

A variety exists on the Sind hills, and in Cutch which has less scales (28) along the lateral-line, and numerous silvery spots along the sides, and a black spot behind the eye, the dorsal and anal fins are likewise more elongated.

Habitat.—From Orissa, through the lower province of Bengal, Burma, Siam to the Malay Archipelago, also the Andamans. (? Also Sind hills.) It attains at least $3\frac{1}{2}$ inches in length.

Family, V—CYPRINIDÆ.

Branchiostegals three: pseudobranchiæ generally present. Body oblong or elongated: abdomen usually rounded, but, if compressed and cutting, destitute of ossicles. Margin of the upper jaw formed by the pre-maxillaries. Opercles in four pieces. Mouth toothless, but from one to three rows of teeth in the inferior pharyngeal bones, which latter are strong, free, and parallel to the branchial arches. A single, rayed dorsal fin. Head scaleless,* body scaled or scaleless, never covered by osseous plates. No "cul de sac" to the stomach, nor pyloric appendages. Air-vessel, if present, large; it may be divided by a constriction into an anterior and posterior portion, neither of which are enclosed by bone *(Cyprininæ)*; or into two lateral portions, partially or entirely enclosed in a bony capsule, (*Cobitidinæ*).

Geographical distribution.—Carps are found in the fresh waters of the Old World and North America.

The family of carps *(Cyprinidæ)* are well represented amongst the piscine inhabitants of the fresh waters and estuaries of India, Ceylon, and Burma, as they and the *Siluridæ* compose the great mass of fish residing there, especially if we do not include the migratory *Clupeidæ.*

Whereas siluroids as a rule appear to prefer muddy water, carps seem to thrive better in those which are clear, still many species of this family obtain their subsistence in dirty waters, for which purpose their barbels may prove of considerable assistance.

There are few members of this family which are such foul feeders as the Siluroids, consequently Carps may be deemed more wholesome and would be greatly preferable, were it not for the numerous bones with which they are provided. Natives however do not seem to much object to this, and as these fish are very abundant in places, they enter largely into the diet of the indigenous population.

Indian carps do not appear to restrict themselves so much to a vegetable diet as do those in Europe, for in the Tropics an eternal and destructive war is constantly being carried on between the different races of the animal kingdom. Those which prey upon their neighbours, as might be anticipated, are largely represented: whilst amongst those that were apparently produced to be preyed upon, it is mostly only the most prolific which have survived.

In the sub-family *Cyprininæ*, as existing in Asia, considerable difficulty arises in selecting a division into *groups.*

In forming such, a very distinctive characteristic may be found by observing whether the scaled edge or margin of the abdomen is rounded or cutting, for in the majority of the Indian *Cyprininæ* the abdominal edge is rounded or smooth, even when somewhat compressed: whilst in a few genera the abdominal edge posterior to the ventral fin is compressed, cutting, and may even be serrated, as in the *Clupeidæ*: this trenchant edge is in some continued from in front of the ventral fins along the thorax.

Irrespective of the above, there are many other characters which might be employed for forming sub-groups and genera. In some, however, which might at first appear suitable for such purposes, one fails to attach that significance to their presence when large numbers of species come under review, showing the existence of connecting links. Some of these characters may be external, others are internal.

The mouth is variously formed; it may be transverse and inferior, with or without a sucker, the latter being present either on the lower lip or existing on both; or it may be narrow, of medium size, or wide: anterior, and either antero-lateral or oblique. The lower jaw again may be prominent, sharp or rounded, shorter than the upper, or sometimes having a knob at the symphysis; a moveable articulation may exist there, or there may be lateral prominences on the mandibles.

The lips may be exceedingly, moderately, or but slightly developed, sometimes absent from one of the jaws, closely investing both, or reflected from off one, or either. There may be an uninterrupted labial fold across the mandible, or portions of the lip may be much developed, fringed, or crenulated. In some genera, a horny or cartilaginous covering to one or both lips is invariably or generally present, especially in forms from the Hills.

The existence of a transverse groove across the snout can scarcely be distinctive of a species, much less of a Genus. Thus in *Discognathus lamta* we find examples with rounded and smooth snouts, and all intermediate forms to such as the one figured Plate cxxii, f. 1. The same may be seen in *Labeo nukta* and several fishes of that Genus, and even in some species of *Barbus*, as *B. dorsalis*. The nearer the hills the more is this groove developed.

* Genus *Leptobotia*, Bleeker, from China forms an exception, its preopercular region having some rows of small scales.

The existence, number or absence of barbels has been considered by some authors to be a reason for constituting genera, but such is not generally held to be valid. These appendages, more especially when the fish are not kept in a state of domestication, or confinement, but left in natural situations, appear to be pretty constant, and though not in themselves cause enough for defining a Genus, are frequently sufficiently well marked for the purpose of forming sub-genera, good examples of which may be seen in the Genus *Barbus*, or *Barilius*. On the other hand, in some species these appendages may be abnormally absent, as in the *Danio*, consequently sub-divisions of the Genus founded solely on this character would lead to erroneous results.

The position of the fins indicate sub-divisions which may be used in the primary groups, and have for convenience sake been adopted as follows :—

a. *Dorsal fin commencing nearly opposite the ventrals, the anal being short.*

b. *Dorsal fin commencing very distinctly posterior to the ventrals, but not extending to above the anal, which last is short, or of moderate length.*

c. *Dorsal fin commencing in the interspace between the ventral and anal, or over the latter, and generally extending to above it : whilst the anal is of moderate length or elongated.*

The character of the dorsal fin is likewise important, but its length alone, or rather the number of its rays, appears insufficient for the purpose of defining a Genus, much less a sub-division of a group. When an uninterrupted series extends from a few rays to a large number, and no other sufficient difference exists, such divisions cannot be considered natural ones : and if artificial, they can never form the basis of a scientific classification.

The last undivided dorsal ray is variously formed, being articulated or osseous, which latter may be smooth or denticulated, but all these varieties may be found in a single Genus, as *Barbus*. The anal fin sometimes shows peculiarities, as in the *Barbus apogon*, C. and V., where the undivided rays are spinate.

Scales, simply as regards their size, unless conjoined to other characteristics, cannot by themselves be taken as a reason for making Genera, because large, moderate, and small-sized scales are all occasionally found represented in a single Genus. But certain modifications may exist, as in the mountain barbels, *Schizothoracinæ*, where a row of tiled scales encloses the excretory outlets and base of the anal fin ; or portions of the body may be naturally left scaleless.

The lateral-line has been employed as one of the signs for the formation of groups, according to its position, as along the middle of the side, or near the abdominal edge ; a plan I have not adopted, because its complete existence in some species seems of but little importance : thus in the Genera *Barbus*, or *Barilius*, it may be present, or partially absent, sometimes ceasing after proceeding along a very few rows of scales.

As to the internal characters, the skeleton forms one of the most important features, respecting which much still remains to be investigated in the Indian carps, and the same remarks apply to the internal organs.

The pharyngeal teeth are in from one to three series, but these numbers alone do not always suffice for the definition of even Genera : thus in the *Chelas* some have them in two and others in three rows. Even the form of those teeth is not invariably similar in all the species of the same Genus : thus in the *Rohtee microlepis*, Blyth, these teeth have serrations on their edges, and the two largest of the anterior row are molariform, whereas crooked and pointed ones are the rule in the Genus. Likewise the teeth are deciduous, being constantly shed and replaced : they may become blunted with age, although they had at first been sharp and pointed.

I have not retained the sub-family, *Homalopterina*, or carps destitute of an air-vessel, because *Psilorhynchus* links it very naturally with *Discognathus*. In short most of the distinctive characters consist of possessing a single row of pharyngeal teeth and the absence of the air-vessel. In many fishes these however are deemed insufficient on which even to characterize genera. *Homaloptera* leads very naturally from some of the mountain siluroids to the true carps on one hand, and to the Loaches on the other.

A. Abdomen rounded, not trenchant.

A.—Dorsal fin commencing nearly opposite the ventrals. Anal short (5 to 7 branched rays.)

Genus, 1—HOMALOPTERA, *v. Hasselt.*

Balitora, Gray : *Platycara*, McClelland.

Head and anterior part of body depressed : snout more or less spatulate. Mouth small, inferior, with two pairs of rostral barbels, and one at either angle of the mouth. Pharyngeal teeth small, from 5 to 16 in one row. Pectoral and ventral fins with many rays, the outer of which are simple. Dorsal short, situated opposite to the ventrals : anal likewise short.

Geographical distribution.—Through some of the hilly districts of the Himalayas to the Wynaad and Bowany river in the Madras Presidency : also found in the fresh waters of Java and Sumatra.

SYNOPSIS OF SPECIES.

1. *Homaloptera Brucei*, D. 3/8, A. 2/5, L. l. 70. Lower caudal lobe the longer. Brown blotched with a darker tinge. Himalayas and South India.

2. *Homaloptera maculata*, D. 10, A. 2/5, L. l. 78. Boutan and Khasia Hills, also southern India.
2. *Homaloptera bilineata*, D. 9, A. 6. Horizontal bands. Tenasserim Provinces.

1. Homaloptera Brucei, Plate CXXII, fig. 1.

Balitora Brucei, Gray and Hard., Ind. Zool.; McClelland, Ind. Cyp., p. 299, 428, pl. 49, fig. 1. (From Gray and Hard.); Cuv. and Val. xviii, p. 101.

Platycara australis, Jerdon, M. J. L. and Sc. 1849, p. 333.

Homaloptera Brucei, Day, Proc. Zool. Soc. 1867, p. 348; Günther, Catal. vii, p. 340.

Cal-cundee, Tamil. "Stone Carp."

B. iii, D. 11($\frac{3}{8}$), P. 21, V. 11, A. 7($\frac{2}{5}$), C. 17, L. l. 70, L. tr. 10/7.

Length of head $6\frac{1}{2}$, of caudal 5 in the total length, *Eyes*—$2\frac{1}{2}$ diameters from end of snout, 1 diameter from end of opercle. Snout broad and depressed, with sharp margins: rostral and maxillary barbels small. *Teeth*—pharyngeal, conical. 15, in one row. *Fins*—pectoral nearly reaches the ventral, its anterior nine rays are unbranched, as are also the first two of the ventral. Lower caudal lobe much the longer. *Scales*—absent from chest and as far as the posterior margin of the base of the ventrals. *Colours*—dark brown with darker blotches: caudal banded.

Habitat.—Wynaad and Bowany rivers in Madras, Himalayas from about Darjeeling through Boutan. Assam, and the Khasia Hills.

2. Homaloptera maculata, Plate CXXII, fig. 2.

Balitora maculata, Gray and Hard. Ind. Zool.; Cuv. and Val. xviii, p. 102.

Platycara maculata, McClell. Ind. Cyp. pp. 299, 427, pl. 49, fig. 2 (from Gray and Hard.)

Platycara anisura, McClell. Cal. Journ. Nat. Hist. ii, p. 587, pl. 16, fig. 1.

Homaloptera maculata, Günther, Catal. vii, p. 349.

B. iii, D. 10($\frac{2}{8}$), P. 19, V. 9, A. 7($\frac{2}{5}$), C. 17, L. l. 70.

Length of head $5\frac{3}{4}$ to 6, of caudal 6, height of body 7 in the total length. *Eyes*—directed upwards and outwards, diameter 1/5 of length of head, 3 diameters from end of snout, 2 diameters apart. Interorbital space convex. Snout broad, depressed: lips fringed. Rostral barbels short, their length equalling about 2/3 of the diameter of the orbit, the pair at the angle of the mouth thicker and slightly longer. *Teeth*—pharyngeal, 5, in one row. *Fins*—dorsal arising rather nearer the end of snout than the base of caudal. Pectoral nearly reaching the ventral, its outer 8 rays unbranched Two outer ventral rays simple. Caudal lobed in its posterior third. *Scales*—cycloid. *Lateral-line*—complete. *Colours*—dull olive, becoming yellowish beneath. Large brown blotches on the body. Dorsal fin with three rows of dull spots: pectoral and ventral with three or four, anal with two, caudal with three irregular bands, and black tips.

Habitat.—Wynaad, the Bowany river, also the Himalayas. The specimen figured (from the Wynaad) is a male.

3. Homaloptera bilineata, Plate CXXI, fig. 8.

? Cyprinus sucatio, Ham. Buch. Fish. Ganges, pp. 347, 393; Cuv. and Val. xvi, p. 448.

? Psilorhynchus sucatio, McClelland, Ind. Cyp. pp. 300, 429, pl. 1. f. 1, (from H. B.'s MS.); Günther, Catal. vii, p. 343.

Homaloptera bilineata, Blyth, Proc. Asi. Soc. of Beng. 1860, p. 172.

Nemacheilus serpentarius, Day, Proc. Zool. Soc. 1869, p. 551.

B. iii, D. 10($\frac{2}{8}$), P. 17, V. 9, A. 7($\frac{2}{5}$), C. 19, L. l. 64, L. tr. 12/17.

Length of head 1/5, of caudal 1/5, height of body nearly 1/5 of the total length. *Eyes*—small, behind the middle of the length of the head, about 4 diameters from end of snout, and 3 diameters apart. Snout pointed. Upper lip fimbriated. *Barbels*—short, six in number, the maxillary pair the longest. *Fins*—dorsal arises slightly in advance of the ventrals, and midway between the snout and the base of the caudal fin, its upper margin straight. Pectoral, having its five outer rays unbranched, reaches two-thirds of the distance to the ventral, and the latter above half-way to the anal. Caudal deeply emarginate, its lobes pointed. *Scales*—smooth, with a raised keel along their centres, and increasing in size in the last half of the body. *Lateral-line*—complete. *Air-vessel*—absent. *Colours*—brownish, with a wide dark chestnut band passing from the snout through the orbit to the base of the dorsal fin, which last has a black centre. Caudal deep brown with white margins. - A black bar across the base of the ventrals.

This species appears closely allied to Buchanan's fish from the rivers of Northern Bengal, which however is said to have the snout much longer than the remainder of the head. The eyes are represented as large, but only stated to be far back and globular. *Fins*—dorsal high, anteriorly with a very oblique upper margin. *Colours*—superiorly greenish, with scattered dots: sides clouded: abdomen whitish. Fins dotted.

Habitat.—Three specimens are in the Calcutta Museum, from the Tenasserim provinces.

Genus, 2—Psilorhynchus, *McClelland.*

Back somewhat elevated, head moderately depressed: snout more or less spatulate. Mouth small, transverse, inferior. Lips entire, not continuous, reflected from off both jaws, and studded with glands. Barbels absent. Dorsal

fin with few rays, commencing opposite the ventrals. Pectorals horizontal, with their outer rays unbranched. Anal short. Scales of moderate size, none on the chest. Lateral-line complete, continued direct to the centre of the base of the caudal fin. Air-vessel present.

This Genus, as illustrated by the single example described, is a connecting link between *Homaloptera* and *Discognathus*.

Geographical distribution.—Hill streams and rivers in Bengal and Assam.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Psilorhynchus balitora*, D. 9-10, A. 7, L. l. 33. Reddish-brown, irregularly marked with black. N. E. Bengal and Assam.

1. Psilorhynchus balitora, Plate CXXI, fig. 7; and Plate CXXII, fig. 3.

Cyprinus balitora, Ham. Buch. Fishes of Ganges, pp. 348, 394; Cuv. and Val. Hist. Nat. des Poissons, xvi, p. 451.

Psilorhynchus variegatus, McClelland, Ind. Cyp. pp. 300, 430, pl. 50, f. 2 (from H. B.'s MSS.).

Psilorhynchus balitora, Günther, Catal. vii, p. 343; Day, Jour. As. Society of Bengal, 1871, p. 106, pl. ix, f. I.

B. iii, D. 9-10 ($\frac{2}{7-8}$), P. 17, V. 9, A. 7 ($\frac{2}{5}$), C. 18, L. l. 35, L. tr. $4\frac{1}{2}/4\frac{1}{2}$.

Length of head $5\frac{1}{4}$, of caudal 5, height of body 5 in the total length. *Eyes*—diameter $4\frac{1}{4}$ in the length of head, $1\frac{1}{4}$ diameters from end of snout, and also apart. Head rounded, somewhat depressed. A deep cleft extending from the snout to the angle of the mouth. Lips rather thick and reflected from off either jaw. The jaws have sharp edges, but are destitute of any horny covering. Edges of lips not fringed, their surface covered with round hard pores. Some fine pores also on the cheeks and snout. *Fins*—dorsal commences in advance of the ventrals: pectorals and ventrals nearly horizontal, the outer seven rays of the former and two of the latter unbranched: caudal forked. *Scales*—$2\frac{1}{2}$ rows between the lateral-line and base of the ventral fin. *Air-vessel*—rather large, divided by a constriction into an anterior and posterior portion, and not enclosed by bone. *Colours*—reddish-brown, with irregular black blotches forming badly defined bands, in places passing over the back. Three bars on the caudal and some black on the anterior half of the dorsal.

Habitat.—Hill streams and rapids in N. E. Bengal and Assam.

Genus, 3—DISCOGNATHUS, *Heckel*.

Garra, Ham. Buch.: *Platycara*, McClelland: *Discognathichthys* et *Lissorhynchus*, Bleeker: *Mayoa*, Day.

Body elongated, subcylindrical. Mouth transverse, semicircular, and inferior; upper and lower lips continuous: no lateral lobes to snout, which projects beyond the mouth. A suctorial disk on the chin, formed on the lower lip, upper lip fringed. Barbels four (Garra, Ham. Buch.) *or one pair only at each angle of the mouth (Discognathus,* Heckel). *Pharyngeal teeth uncinate and in three closely approximating rows,* 2, 4, 5-5, 4, 2, *or* 5, 3, 1-1, 3, 5. *Dorsal fin with few rays, commencing slightly in advance of the ventrals, its base scaleless: pectoral horizontal: anal short. Scales of moderate size, no enlarged anal row. Lateral-line continued to the centre of the base of the caudal fin. Gill-rakers few, short, and widely set. Air-vessel small.*

Geographical distribution.—Rivers, more especially mountain streams, of Asia and Abyssinia: extending throughout India, Ceylon, and the Tenasserim Provinces.

SYNOPSIS OF SPECIES.

1. *Discognathus lamta*, D. 11, A. 7, L. l. 33-36, 4 barbels. Interorbital space convex. Head $4\frac{1}{2}$ to $5\frac{1}{2}$ in the total length. A black spot behind gill-opening and generally a band along the side. Throughout India, Ceylon, and Tenasserim Provinces, Abyssinia and Aden.

2. *Discognathus Jerdoni*, D. 10, A. 7, L. l. 36, 4 barbels. Interorbital space concave. Head $6\frac{1}{4}$ to $6\frac{1}{2}$ in the total length. Wynaad and Bowany rivers in Madras.

3. *Discognathus modestus*, D. 10, A. 6, L. l. 35, 4 barbels. Interorbital space flat: 5 outer pectoral rays unbranched. Northern India (?).

1. Discognathus lamta, Plates CXXII, fig. 4, and CXXIII, fig. 1.

Cyprinus lamta, Ham. Buch. Fish. Ganges, pp. 343, 393; Cuv. and Val. xvi, p. 386.

Cyprinus gotyla, Gray and Hardwicke, Ind. Zool. c. fig.; Cuv. and Val. xvi, p. 387.

Gonorhynchus rupeculus, McClelland, pp. 281, 373, pl. 43, f. 4, 5; Cuv. and Val. xvi, p. 467.

Chondrostoma mullya, Sykes, Trans. Zool. Soc. ii, p. 359, pl. 62, f. 3.

Gonorhynchus bimaculatus, brachypterus, and *caudatus*, McClell. loc. cit. pp. 281, 283, 373, 374, pl. 43, f. 2. (from H. B.'s MS.); Cuv. and Val. xvi, pp. 414, 467.

Platycara nasuta, McClell. Journ. A. S. of B. vii, p. 947, t. 55, f. 2*a* and *b*, and Ind. Cypr. pp. 300, 428, pl. 57, f. 2.

? *Platycara lissorhynchus*, McClell. Cal. J. N. H. ii, p. 587, pl. xvi, f. 2.
Discognathus rufus, obtusus, crenulatus, and *fusiformis*, Heckel, Russegger's Reisen, i, pp. 1071, 1072, t. 8, f. 2 and 3, and ii, p. 262, and iv, p. 387, c. fig.
Lobocheilos ? caudatus, gotyla and *lamta*, Bleeker, Beng. p. 66.
Platycara notata, Blyth. Journ. A. S. of B. 1860, p. 161.
Gonorhynchus gotyla, McClellandi and *stenorhynchus*, Jerdon, M. J. L. S. 1849, pp. 309, 310.
Garra Ceylonensis, Bleeker, Cobit. et Cyprin. Ceylon, p. 8, t. 1, f. 4.
Garra gotyla and *lamta*, Steind. Sitz. Ak. Wiss. Wien, lvi, t. 2.
Garra Malabarica, Day, Proc. Zool. Soc. 1865, p. 297, and Fishes of Malabar, p. 205, pl. 15, f. 1.
Garra gotyla and *alta*, Day, Proc. Zool. Soc. 1867, pp. 288 and 349.
Discognathus lamta and *macrochir*, Günther, Catal. vii, pp. 69 and 70.
Kul korava, Tam. "The stone Ophiocephalus, *Pandi-pakke*, Can." : *Korafi-kaoli*, Hind. (Mysore) : *Putterchettah*, Hind. (N. W. Provinces) : *Choak-si*, Beng. : *Dhoguru* and *Koorka*, Punj.

B. iii, D. 11 ($\frac{3-2}{8-9}$), P. 15, V. 9, A. 7 ($\frac{2}{5}$), C. 17, L. l. 32-36, L. tr. 4-4½/5, Vert. 18-14.

Length of head 5 to 5½, of caudal 5 to 6¼, height of body 5 to 6 in the total length. *Eyes*—directed slightly upwards and outwards and situated in the commencement of the last half of the head, more rarely in its centre, diameter 5 to 8 in the length of head, 2½ to 3 diameters apart. Interorbital space convex. Snout very diversified, either smooth, or covered with pores, and having or not having a deep transverse depression : in some specimens, as from the salt range in the Punjab (see Plate cxxi, fig. 1), or from the Chumba State, there is a regular spinate covering to a gland on either side of the snout, in some all the glands are thus constructed. *Fins*—the dorsal arises midway between the end of the snout and the base of the caudal, and anterior to the origin of the ventral, it is usually less in height than the body. The pectoral shorter than the head : caudal slightly lobed. *Air-vessel*—small, its posterior portion minute. Ova small, numerous. *Colours*—greenish, with a bluish-green band along the centre of the body, and extending along the middle of the caudal fin. Generally a dark spot behind the gill-opening. Abdomen yellowish-green. Fins yellowish, stained darker at their margins. In specimens from the Tenasserim Provinces a black spot exists at the base of each dorsal ray, this is also seen in those from the Himalayas at Chumba, where the fins are all tipped with black. In Malabar and Canara some have a dark band along the side, with an orange one above and another below it.

Habitat.—From Syria throughout India and Ceylon to the Tenasserim Provinces, and likewise found in Abyssinia and at Aden. It attains at least 8 inches in length. This fish putrifies very rapidly after death, and generally dies almost as soon as removed from the water.

2. Discognathus Jerdoni, Plate CXXII, fig. 6.

Day, Proceed. Zool. Society, 1867, p. 288.
Gonorhynchus gotyla, Jerdon, M. J. L. and Sc. 1849, p. 309 (not Gray and Hard.).

B. iii, D. 10 ($\frac{2}{8}$), P. 16, V. 9, A. 7 ($\frac{2}{5}$), C. 17, L. l. 36, L. tr. 4½/2½.

Length of head 6¼ to 6½, of caudal 6¼, height of body 6¼ in the total length. *Eyes*—diameter 3½ to 4 in the length of the head, 1 diameter from end of snout, and 2 diameters apart. Interorbital space rather deeply concave. Snout in the young smooth, but in larger specimens it has a depression across it and some pores. *Barbels*—two pairs. *Fins*—dorsal arising about midway between the end of snout and commencement of the origin of the anal fin, its height exceeds the length of the head. Pectoral rather longer than the head, but does not quite reach the ventral, which is equally long. Anal does not quite reach the caudal, which is deeply forked. *Colours*—olivaceous, becoming yellowish on the sides and beneath. A black spot behind the gill-opening. Pectoral and ventral fins yellowish, with the outer portion dark gray margined with orange. Dorsal, anal, and caudal yellowish, with gray markings, the lower caudal lobe gray, with a light outer edge.

This species is distinguished from *D. lamta* by its comparatively short head, large eye, concave interorbital space, position of its dorsal fin, its elongated pectoral and ventral, and deeply forked caudal.

Habitat.—Bowany river at foot of Neilgherries in the Madras Presidency, also the Wynaad. The specimen figured is upwards of 8 inches in length.

3. Discognathus modestus, Plate CXXII, fig. 5.

Mayoa modesta, Day, Proc. Zool. Soc. 1869, p. 553.

B. iii, D. 10 ($\frac{2}{8}$), P. 15, V. 9, A. 6($\frac{1}{5}$), C. 19, L. l. 35, L. tr. 4½/3½.

Length of head 5¼, of caudal 5, height of body 5½ in the total length. *Eyes*—near the upper surface of the head, diameter ¼ of length of head, 2 diameters from end of snout, 2 diameters apart. Head broad, depressed. Interorbital space flat. Lower surface of head and chest flat. The snout overhangs the mouth, which is rather small, transverse, and nearly semilunar in shape. Mouth, with an adhesive sucker, which is posterior to the lower jaw. The lips are reflected from off both jaws, and have a tuberculated surface : margin of upper lip fimbriated. *Barbels*—four, one rostral and one maxillary pair, all being rather thick and short. *Teeth*—pharyngeal, uncinate, 5, 3, 1-1, 3, 5. *Fins*—pectorals and ventrals horizontal, the former extending to the latter, which reaches the anal. First five outer pectoral rays simple. Dorsal arises in advance of the ventral. Caudal slightly forked. *Scales*—none on the chest. *Colours*—greenish-brown, with no marks existing except a dark blotch under the dorsal fin, and a mark at the base of the caudal.

Habitat.—Probably Northern India, two specimens exist in the Calcutta Museum, the longest being $3\frac{1}{2}$ inches.

Genus, 4—Oreinus, *McClelland.*

Schizothorax, Sect. A, and *Schizopyge*, sp. Heckel.

Abdomen rounded. Snout rounded, mouth inferior and transverse, mandibles short, broad, and flat, loosely joined together at the symphysis: margin of the lower jaw having a hard, horny covering, thickest internally, and a thick fringed lower lip with a free posterior edge, forming a sucker. Barbels four. Pharyngeal teeth pointed, hooked, 5, 3, 2/2, 3, 5. *Dorsal fin rather short and arising opposite the ventrals, its last undivided ray osseous, serrated or entire: anal short. Scales very small; the vent and base of the anal fin in a sheath covered by an enlarged tiled row of scales. Lateral-line passing to the centre of the base of the caudal fin.*

Although the serrated spine in the dorsal fin is commonly termed *the last undivided ray or spine*, such has merely reference to its being *unbranched*, for in reality this spine consists of two separate, compressed and serrated bones attached one to the other in their whole extent.

It must also be noticed that too much stress must not be laid upon the comparative size of the tiled row of scales to the diameter of the eye as such varies, as is easily explained. The number of scales remains the same throughout the fish's life, and therefore their size continues to increase in accordance with that of the body of the fish. The eye, however, does not continue increasing in the same proportion, so that a species in which its diameter is say 4 in the length of the head in the young, is 6 or even 8 in that of the adult. It naturally follows that the size of the tiled row of scales is often far greater in the adult in comparison to the dimension of the eye than it is in the young. Likewise it is very common to find specimens in which the height of the body is much less than normally exists, these appear half-starved or sickly fishes.

Geographical distribution.—Rivers and some lakes in the Himalayan and sub-Himalayan region extending to the confines of China.* These fishes are rarely found in the rivers of the plains at any distance from the base of the mountain ranges. This Genus and the four succeeding ones of *Schizopygopsis*, *Schizothorax*, *Ptychobarbus*, and *Diptychus*, consist of Carps, scaleless or more or less covered with minute scales. A membraneous slit exists anterior to the anal fin, which is laterally bounded by a row of vertically placed scales, like eave-tiles, and which are continued along the base of the anal fin. They form the Schizothoracinæ of McClelland.

SYNOPSIS OF SPECIES.

1. *Oreinus sinuatus*, D. 4/7, A. 3/5. Anal scales about 1/2 as large as orbit. Black spots on body. Afghanistan, Punjab, Cashmere, and along the Himalayas.
2. *Oreinus Richardsonii*, D. 3/8, A. 3/5. Anal scales 2/3 as large as orbit. Colours uniform. Nepaul.
3. *Oreinus plagiostomus*, D. 3/8, A. 3/5. Anal scales about as large as orbit. Osseous dorsal ray weak. Colours uniform. Afghanistan, Cashmere to Upper Assam.

Geographical distribution.—Throughout the Himalayan and sub-Himalayan range to Assam and the confines of China.

1. Oreinus sinuatus, Plate CXXIV, fig. 4.

Schizothorax sinuatus, Heckel, Fische aus Kaschmir, p. 21, t. 2.
Oreinus maculatus, McClell., Ind. Cyp. pp. 274, 345, pl. lvii, fig. 6, and Cal. J. N. H. ii, p. 580; Cuv. and Val. xvi, p. 228.
Oreinus sinuatus, Günther, Catal. vii, p. 161.
Gool-goolli and *Saul*, Punj.: *Jis*, Cash.

B. iii, D. $\frac{3-4}{8}$, P. 17, V. 10, A. $\frac{2-3}{5}$, C. 19, L. l. 105, Vert. $\frac{24}{23}$.

Length of head $5\frac{1}{2}$ to 6, of caudal $5\frac{1}{2}$, height of body $5\frac{1}{2}$ to $7\frac{1}{2}$ in the total length. *Eyes*—diameter 2/9 to 1/6 of length of head, 2 to $2\frac{1}{2}$ diameters from end of snout, 2 to $2\frac{1}{4}$ diameters apart, and almost entirely situated in the front 1/2 of the head. Interorbital space rather convex, more so in the adult than in the young: snout rounded, with a very slight appearance of pores. Mouth inferior, transverse: lower lip well developed, rugose, entire, having a free posterior edge, and forming an adhesive sucker. The posterior edge may be concave or slightly lobed in the middle or even straight. Inner side of lower lip covered with cartilage, which is extended on to its inferior surface, where, however, it is not so horny. *Barbels*—of about equal length and not quite so long as the eye. Pre-opercle with an emarginate posterior border. *Teeth*—pharyngeal, 5, 3, 2/2, 3, 5, crooked, pointed. *Fins*—dorsal commences a little before the ventrals, and slightly nearer to the snout than it does to the base of the caudal fin, its spine is rather strong, moderately serrated and rather longer than the head without the snout, the fin is rather higher than the body below it, its last ray is divided into two. Pectoral four-fifths as long as the head, and extending above halfway to the ventral, which last reaches two-thirds of

* Dr. Anderson brought a species of *Oreinus* from the confines of China when with the last Yunam expedition. It is allied to *O. sinuatus* and *O. Richardsonii*, but its body is deeper, its scales more oval in form and larger.

the distance to the anal, its last ray divided to its base. The anal has a narrow base and its length slightly varies, reaching when laid flat, the whole or only three-fourths of the distance to the base of the caudal, which is lobed in its posterior half. Free portion of tail slightly longer than deep. *Scales*—rows above the lateral-line about equal in size to those of the pierced row, rather smaller below it: about 16 to 20 rows between the lateral-line and base of ventral fin, and 21 to 25 between it and base of dorsal: tiled row to vent minute, each scale in it being from one-third to half the diameter of the orbit. *Viscera*—the diameter of the posterior portion of the air-vessel is small. The lobes of the liver are elongated, extending to opposite the anal fin, and having several lateral but parallel prolongations. In May (at Chumba) the ova of these fish inhabiting the main stream, were almost fully developed, being numerous and of a large size, whilst there were a considerable number of fry in the side streams of the Ravi. *Colours*—grayish, becoming white below, pre-opercle dashed with golden: lower fins tinged red. After death two or three rows of dark gray blotches appear above the lateral-line. Some have scattered black and occasionally red spots, and these have been termed *Trout.*

Habitat.—Afghanistan, Himalayan rivers, but not extending in the plains to far from their bases. It adheres to rocks by means of its sucker and is thus enabled to reside in mountain rapids. It attains at least 2 feet in length, is pretty good eating but bony; it is too rich for some people, but does not deleteriously affect those used to it.

2. Oreinus Richardsonii, Plate CXXV, fig. 4.

Cyprinus Richardsonii, Gray and Hard. Illust. Ind. Zoology.

Oreinus Richardsonii, McClell. Ind. Cyp. pp. 273, 345; Cuv. and Val. xvi, p. 227; Günther, Catal. vii, p. 161.

Oreinus guttatus, McClelland, Ind. Cyp. pp. 273, 344, pl. 39, f. 1.

Gonorhynchus petrophilus, McClelland, Journ. Asiat. Soc. of Beng. iv, t. 1, and Ind. Cyp. pp. 281, 371; Cuv. and Val. xvi, p. 466.

Oreinus maculatus, Günther, Proc. Zool. Soc. 1861, p. 224 (not McClelland).

"Kemaon Trout," *Asla*, Nepaul.

B. iii, D. 11 ($\frac{3}{8}$), P. 17, V. 10, A. 7 ($\frac{2}{5}$), C. 19, L. l. 98-100, L. r. 140.

Length of head 4 to 6,* of caudal $4\frac{1}{2}$ to 5, height of body $5\frac{1}{2}$ to $6\frac{1}{4}$ in the total length. *Eyes*—in the middle or rather before the middle of the length of the head, diameter 5 to $6\frac{1}{2}$ in the length of head, width of interorbital space in adults nearly equals 1/2 length of head, it is almost flat. Snout obtuse. Mouth inferior, transverse, with a well-developed lower lip, which has its posterior free edge straight or rather convex. Occasionally there are large pores on the snout. *Barbels*—about 1/2 as long as eye. *Teeth*—pharyngeal, 4, 4, 2/2, 4, 4, crooked, pointed. *Fins*—dorsal commencing slightly before the ventral, and about midway between the snout and base of the caudal, its spine moderately strong, toothed, becoming nearly smooth in large specimens, and as long as the head excluding the snout. Pectoral 4/5 as long as the head. Ventral does not reach anal, nor the latter the caudal. *Scales*—24 rows between the lateral-line and base of the dorsal fin, and 19 between it and the ventral: the scales of the tiled row equal 2/3 of the diameter of the eye in the young, as high as the diameter of orbit in adults. Free portion of the tail as long as deep. *Colours*—bluish along the back, becoming silvery shot with gold on the sides and beneath. Head likewise glossed with purple and gold. In some specimens there are black spots on the sides and head.

Habitat.—The specimen figured was from Darjeeling. It inhabits Nepal, Boutan, and the sub-Himalayan range.

3. Oreinus plagiostomus.

Schizothorax plagiostomus, Heckel, Fische aus Caschmir, p. 16, t. 1; Cuv. and Val. xvi, p. 213.

Oreinus plagiostomus, McClelland, Cal. Journ. Nat. Hist. ii, 1842, pp. 570, 581; Günther, Catal. vii, p. 160.

Capoeta micracanthus, Günther, Catal. vii, p. 81.

B. iii, D. 10-11 ($\frac{2-3}{8}$), P. 17, V. 11, A. 7 ($\frac{2}{5}$), C. 19, L. l. 110. L. r. 170.

Length of head $5\frac{1}{2}$ to 6, of caudal $5\frac{1}{2}$ to 6, height of body 4 to $5\frac{1}{2}$ in the total length. *Eyes*—diameter $4\frac{1}{2}$ to 8 in the length of head, and in or rather before the middle of the length of the head. Snout broad, interorbital space nearly flat, and equalling about 1/2 length of head: mouth transverse, inferior: lower lip with a nearly straight and free posterior margin, and studded with glands, some specimens have glands on the snout. *Barbels*—not so long as the eye. *Teeth*—pharyngeal, crooked, pointed, 5, 4, 2/2, 4, 5. *Fins*—dorsal osseous ray weak, its stiff portion as long as the head without the snout, its serrature being feeble, almost absent in adults: the fin is not so high as the body, it commences somewhat in advance of the ventrals, and midway between the end of the snout, and the root of the caudal: anal when laid flat reaches the base of the caudal: the scales along its base well-developed, the largest being about the size of the orbit in the young, exceeding it in the adult. *Colours*—uniform silvery, or with black spots.

* In the Catalogue of Fishes of the British Museum it is stated of this species:—"Head very small, its length being 2/11 or 1/6 of the total (without caudal)." Having been permitted access to the same fish I found of those *in spirit*, 4 specimens from 3·3 to 3·8 inches long, head from 4 to $4\frac{2}{3}$ in the total with the caudal: one 4 inches long, head $4\frac{1}{4}$; one $5\frac{1}{2}$ inches long, head $4\frac{1}{2}$; and one 9 inches long, head $5\frac{1}{3}$ in the total with the caudal fin. Amongst the skins one 10 inches long, head 5 in the total; one 15 inches long, head $5\frac{1}{3}$; and one 18 inches long, head 6 in the total including the caudal fin.

O. Griffithi, McClelland, l. c. p. 581, is said to differ but little from the above, its intestines are six times the length of the body, its *habitat* is Afghanistan, Koonur river, Pushut.

Capoeta macracanthus, Günther, has a very weak dorsal spine.

Habitat.—Afghanistan, Cashmere, and Boutan.

Genus, 5—SCHIZOPYGOPSIS, *Steindachner.*

Abdomen rounded. Snout obtusely conical. Mouth transverse, inferior, with a slight cleft; mandible with a sharp anterior edge, having a horny covering, and the upper lip continuous with a short lateral one. Barbels absent. Pharyngeal teeth compressed, 4 or 3, 3/3, 3 or 4. Dorsal fin short, with a serrated ray, and situated nearly opposite to the ventrals: anal short. Scales small, few, and only present in the scapular region, except a scaled sheath to vent and along the base of the anal fin. Lateral-line continued to the centre of the base of the caudal. Ova comparatively large.

Geographical distribution.—Head waters of Indus, Tibet, and Eastern Turkestan.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Schizopygopsis Stoliczkæ*, D. 4/7, A. 2/5.

1. Schizopygopsis Stoliczkæ, Plate CXXIV, fig. 2.

Steind. Verh. zool.-bot. Ges. Wien, 1866, p. 785; Günther, Catal. vii, p. 170; Day, Proc. Zool. Soc. 1876, p. 791.

B. iii, D. 10-11 ($\frac{3}{7}$-$\frac{4}{8}$), P. 13, V. 11, A. 7 ($\frac{2}{5}$), C. 19.

Length of head 5 to $5\frac{3}{4}$, of caudal $5\frac{1}{2}$ to $5\frac{3}{4}$, height of body 7 to 8 in the total length. *Eyes*—diameter 4 to 5 in the length of the head, 1 to $1\frac{1}{2}$ diameters from the end of the snout, and $1\frac{1}{2}$ to 2 apart. The greatest width of the head equals its length behind the middle of the eyes, and its height equals its length excluding the snout. Mouth inferior, overhung by the snout, the maxilla reaches to below the front edge of the eye. An anterior, sharp, horny edge to the mandible. *Fins*—the dorsal as high as the body, it commences about midway between the end of the snout and the root of the caudal fin, its upper edge nearly straight, oblique: its last undivided ray osseous, and finely serrated. Pectoral not quite so long as the head, and reaching rather above halfway to the ventral, which latter arises below the middle of the dorsal and does not reach the anal. Anal rather above twice as high as its base is long, it extends to the caudal when laid flat. Caudal deeply forked. *Colours*—olive superiorly, becoming white on the sides and beneath, the whole covered with irregular blackish spots.

Habitat.—Leh and head waters of Indus, also tributaries of the Yarkand and Oxus rivers.

Genus, 6—SCHIZOTHORAX, *Heckel.**

Schizopyge, sp. Heckel: *Racoma*, sp. McClell.: *Opistocheilus*, pt. Bleeker.

Abdomen rounded. Snout conically rounded, and laterally somewhat compressed, with the mouth arched and antero-inferior, mandible neither broad, flattened, nor with a sharp margin, its edge sometimes having a thin, deciduous horny covering. Barbels four. Pharyngeal teeth pointed, hooked, 5, 3, 2/2, 3, 5. Dorsal fin rather short, with a strong, osseous, serrated ray, and arising opposite the ventrals: anal short. Scales very small, the vent and base of the anal fin in a sheath, covered by an enlarged tiled row. Lateral-line passing to the centre of the base of the caudal fin.

Geographical distribution.—Mountain streams and rivers of the Himalayan region, also Afghanistan and Turkestan.

* The following species of this Genus have also been recorded, some are figured in this work:—

A. Lower labial fold uninterrupted.

a. Dorsal spine strong, serrated.

1. *Schizothorax barbatus*, McClelland, Cal. Journ. Nat. Hist. ii, p. 580; Günther, Catal. vii, p. 168. Eye 1/5 of head. Upper jaw projecting. Origin of dorsal fin rather nearer caudal than snout: its spine very strong, serrated. Anal laid flat does not reach caudal. Tiled rows of scales small. Afghanistan.

b. Dorsal spine feeble, serrated.

2. *Schizothorax Ritchianus*, McClell. Cal. Journ. Nat. Hist. ii, p. 580; Günther, Catal. vii, p. 168. Eye 1/5 of head. Upper jaw projecting. Origin of dorsal fin rather nearer caudal than snout: its spine feeble, serrated. Anal laid flat does not reach caudal. Tiled row of scales of moderate size. Afghanistan.

3. *Schizothorax Edeniana*, McClelland, l. c. p. 579. Upper jaw the longer. Dorsal spine feebly serrated near its base. Scales rather above the ordinary size. Cabul river.

B. Lower labial fold interrupted.

a. Dorsal spine strong, serrated.

4. *Schizothorax niger*, Heckel, Fische aus Cashmir, p. 29, t. v; Günther, Catal. vii, p. 164. Eye 1/5 of head. Upper jaw the

SYNOPSIS OF SPECIES.

1.—*Schizothorax progastus*, D. 11-12, A. 7, L. l. 150. Snout elongated. Lower lip with a free posterior edge. Dorsal spine coarse. Himalayan and sub-Himalayan range, from the head waters of the Ganges to Upper Assam.

2. *Schizothorax esocinus*, D. 12, A. 7. Lower labial fold interrupted. Dorsal spine coarse. Head waters of Indus, Cashmere, and Afghanistan.

1. Schizothorax progastus, Plate CXXII, fig. 7.

Oreinus progastus, McClell. Ind. Cyp. pp. 274, 343, pl. 40, f. 4; Cuv. and Val. xvi, p. 325.
Oreinus Hodgsonii, Günther, Proc. Zool. Soc. 1861, p. 224.
Schizothorax Hodgsonii, Günther, Catal. vii, p. 167.
Dinnawah, N. W. Prov.: *Adoee* and *Loh-one*, Assamese.

B. iii, D. 11-12 ($\frac{3}{8-9}$), P. 19, V. 11, A. 2/5, C. 19, L. l. 150-160.

Length of head $5\frac{1}{4}$ to $5\frac{1}{2}$, of caudal $5\frac{1}{4}$, height of body 6 in the total length. *Eyes*—from $4\frac{1}{2}$ to 6 diameters in the length of the head and situated in its middle. Interorbital space nearly flat: snout pointed. Width of head equals half its length. Depth of cleft of mouth equals the width of the gape. Upper jaw projecting: lip thick and fleshy, having a free posterior edge in its whole circumference, upper lip elevated in the centre, lower with a central lobe and a lateral one on either side. Lips internally covered with a thin, deciduous, cartilaginous layer. *Barbels*—four, the rostral about as long as the orbit, the maxillary pair rather shorter. *Teeth*—pharyngeal, crooked, pointed, 5, 3, 2/2, 3, 5. *Fins*—dorsal commences slightly in

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longer. Barbels shorter than the eye. Origin of dorsal fin nearer caudal than snout: spine as long as head excluding snout. Anal laid flat, not reaching caudal. Tiled rows of scales as wide as orbit. Small black spots on the sides. Cashmere.

5. *Schizothorax punctatus*, Day, Proc. Zool. Soc. 1876, p. 785, pl. cxxiii, fig. 3. Eye $6\frac{2}{3}$ in length of head. Lower jaw the longer. Barbels as long as eye. Origin of dorsal fin nearer caudal than snout: spine as long as postorbital portion of head. Anal laid flat does not reach caudal. Tiled row of scales one-third diameter of orbit. Covered with black spots. Cashmere.

6. *Schizothorax micropogon*, Heckel, l. c. p 41, t. viii, f. 1; Günther, l. c. p. 163. Eye $4\frac{1}{2}$ in head. Upper jaw the longer. Barbels minute. Origin of dorsal fin much nearer caudal than snout: spine as long as the head excluding snout. Anal laid flat does not reach caudal. Tiled row of scales minute. Cashmere.

7. *Schizothorax planifrons*, Heckel, l. c. p. 44, t. viii, f. 2; Günther, l. c. p. 163. Eye $5\frac{1}{2}$ in length of head. Jaws of equal length. Barbels as long as eye. Origin of dorsal fin nearer caudal than snout: its spine 3/5 as long as head. Anal laid flat nearly reaches caudal. Tiled row of scales half width of eye. Cashmere.

8. *Schizothorax Hugelii*, Heckel, l. c. p. 36, t. vii; Günther, l. c. p. 164. Eye 6 in length of head. Upper jaw slightly the longer. Barbels shorter than eye. Origin of dorsal fin nearer caudal than snout: its spine short and feebly serrated. Anal laid flat nearly reaches caudal. Tiled row of scales much broader than the eye. Cashmere.

9. *Schizothorax curvifrons*, Heckel, l. c. p. 25, t. iii; Günther, l. c. p. 164. Eye $5\frac{1}{2}$ in length of head. Upper jaw slightly the longer. Barbels half as long as eye. Origin of dorsal fin nearer caudal than snout: its spine nearly as long as head, and feebly serrated. Anal laid flat does not reach the caudal. Tiled row of scales small. Cashmere.

10. *Schizothorax intermedius*, McClelland, l. c. p. 579; Günther, l. c. p. 165; Day, l. c. p. 786, and Plate cxxiv, f. 1. Eye $5\frac{1}{2}$ in the length of head. Upper jaw the longer. Barbels as long as eye. Origin of dorsal fin nearer caudal than snout: its spine 2/3 to 4/5 as long as head, coarsely serrated. Anal laid flat reaches the caudal. Tiled row of scales half as deep as orbit. Afghanistan and Turkestan.

11. *Schizothorax nasus*, Heckel, l. c. p. 33, t. vi; Günther, l. c. p. 166. Eye 6 in length of head. Upper jaw the longer. Barbels shorter than the eye. Origin of dorsal fin midway between end of snout and root of caudal: its spine as long as head excluding the snout, rather finely serrated. Anal laid flat scarcely reaches the caudal. Tiled row of scales 1/2 as deep as orbit. Cashmere.

12. *Schizothorax microcephalus*, Day, l. c. p. 787, Plate cxxv, fig. 2. Eye 7 in length of head. Upper jaw the longer, and overhung by snout. Barbels twice as long as eye. Dorsal fin commences rather nearer snout than caudal: its spine very weak and feebly serrated. Anal when laid flat reaches caudal. Tiled row of scales minute. Panja from a tributary of the Oxus.

13. *Schizothorax longipinnis*, Heckel, l. c. p. 27, t. iv; Günther, l. c. p. 166. Eye 5 in length of head. Upper jaw slightly the longer. Barbels nearly 1/2 as long as eye. Dorsal fin commences nearer caudal than snout: its spine moderately strong and serrated. Anal laid flat reaches caudal. Tiled row of scales not 1/2 as broad as orbit. Cashmere.

14. *Schizothorax chrysochlorus*, Day, l. c. p. 784, and Plate cxxiii, fig. 2; *Racoma chrysochlora*, McClelland, l. c. p. 577, t. xv, f. 3; *S. Biddulphi*, Günther, Ann. and Mag. Nat. Hist. 1876, p. 400. Eyes from $5\frac{1}{2}$ to 7 in length of head. Upper jaw the longer. Barbels at least as long as the eye. Dorsal fin arises midway between end of snout and base of caudal: its spine strong, serrated, and as long as the head. Anal when laid flat reaches 1/2 way to the caudal. Tiled row of scales 1/2 as broad as the eye. Afghanistan and Turkestan.

15. *Schizothorax nobilis*, *Racoma nobilis*, McClelland, l. c. p. 577, t. xv, f. 4. Eye about 6 in the length of head. Upper jaw the longer. Barbels longer than the eye. Dorsal fin arises nearer snout than base of caudal: its spine as long as head without the snout, serrated. Anal if laid flat reaches the caudal fin. Tiled row of scales about as broad as orbit. Afghanistan.

16. *Schizothorax labiatus*, McClelland, l. c. p. 578, t. xv, f. 1. Eye 4 in the length of head. Barbels terminating in trident points. Upper jaw projecting. Origin of dorsal fin nearer caudal than snout: spine serrated posteriorly. Anal laid flat reaches the caudal fin. Afghanistan.

17. *Schizothorax gobioides*, *Racoma gobioides*, McClelland, l. c. p. 576, t. xv, f. 3. Eye $4\frac{1}{2}$ in the length of the head. Barbels longer than the eye. Upper jaw much the longer. Origin of dorsal fin midway between snout and base of the caudal: its spine as long as the head excluding the snout, and serrated posteriorly. Anal fin laid flat does not reach the caudal. Tiled row of scales about as broad as orbit. Afghanistan.

18. *Schizothorax brevis*, *Racoma brevis*, McClelland, l. c. p. 578. "Head short and compressed. Lips covered with a thick fleshy membrane, which forms a loose appendage to the lower jaw. Depth of body nearly equal to 1/3 of its length. Fins small, rays slender, the dorsal spine slender and soft." Afghanistan.

Amongst the foregoing 18 species it is most probable that several will turn out to be synonyms: some of McClelland's examples may belong to the Genus *Oreinus*.

advance of the ventrals and midway between the end of the snout and root of the caudal fin, its osseous ray strong, coarsely serrated, and as long as the head behind the angle of the mouth. Pectoral does not reach the ventral, nor the latter the anal. Anal when laid flat nearly reaches the base of the caudal, which is deeply forked. *Scales*—in tiled row but little developed, the largest not being half as broad as the orbit. About 18 rows between the lateral-line and base of ventral fin. *Colours*—uniform silvery, sometimes having a few fine spots: fins with darkish edges.

McClelland placed this species as first amongst his *Oreini*. He, however, remarked "muzzle fleshy and pointed, lips thick, somewhat pendulous and muscular." * * "Lengthened and fleshy snout, small mouth." "Body much compressed." This fish, when eaten, is said by the natives of Assam to occasion swimming of the head and temporary loss of reason for several days, without any particular derangement of the stomach.

Habitat.—Himalayas, from the head waters of the Ganges to Suddya in Upper Assam. It is common at Hurdwar where the Ganges debouches into the plains. It attains at least 20 inches in length.

3. **Schizothorax esocinus**, Plate CXXIII. fig. 4.

Heckel, Fische aus Cashmir, p. 48, t. ix; McClelland, Calcutta Journ. Nat. Hist. ii, p. 579: Günther, Catal. vii, p. 166; Day, Proc. Zool. Soc. 1867, p. 785.

B. iii, D. 12 ($\frac{4}{8}$), P. 20, V. 10, A. 7 ($\frac{2}{5}$), C. 20.

Length of head $4\frac{1}{4}$ to $4\frac{1}{2}$, of caudal $5\frac{3}{4}$, height of body $7\frac{1}{4}$ in the total length. *Eyes*—diameter $6\frac{1}{2}$ in the length of head, 2 diameters from the end of snout, and also apart. Interorbital space flat. The greatest width of the head equals its height. Mouth slightly oblique, horse-shoe shaped, the upper jaw the longer: the maxilla reaches to nearly below the front edge of the eye. Lower labial fold interrupted in the middle. A horny covering to inside of the lower jaw. *Barbels*—the rostral ones more than half longer than the eye, the maxillary a little shorter. *Fins*—the dorsal as high as the body, commencing slightly nearer the base of the caudal than to the end of the snout: its last undivided ray osseous, coarsely serrated posteriorly, whilst its bony portion is as long as the head excluding the snout. Pectoral does not quite reach the ventral, the latter which arises beneath the second or third undivided dorsal ray extends two-thirds of the distance to the anal. Length of base of anal about 3/7 of its height, when laid flat it reaches the caudal which is deeply forked. Free portion of the tail as high at its base as it is long. *Colours*—silvery, with numerous black spots, most distinct in the upper half of the body.

Habitat.—Leh or Ladak and head waters of the Indus, also Cashmere and Afghanistan.

Genus, 7—Ptycobarbus, *Steindachner*.

Abdomen rounded, snout conical, mouth arched, anterior or inferior. Two maxillary barbels. Pharyngeal teeth compressed 4, 3/3, 4. Dorsal fin situated opposite the ventrals, without or with a feeble osseous ray, which is smooth or serrated: anal short. Scales small, covering the body, and forming a sheath at the base of the vent and anal fin. Lateral-line continued to the centre of the base of the caudal.

Geographical distribution.—Head waters of the Indus, Tibet and Kashgar.

SYNOPSIS OF INDIVIDUAL SPECIES.*

1. *Ptycobarbus conirostris*, D. 11, A. 8. Tibet.

1. **Ptycobarbus conirostris**, Plate CXXV, fig. 3.

Steind., Verh. zool.-bot. Ges. Wien, 1866, p. 789, t. 17, f. 4; Günther, Catal. vii, p. 169; Day, Proc. Zool. Soc. 1876, p. 789.

B. iii, D. 10 ($\frac{2}{8}$), P. 22, V. 10, A. 7-8, C. 19, L. l. 95, L. tr. 24/—.

Length of head $4\frac{3}{4}$ to 5, of caudal $7\frac{1}{4}$, height of body $6\frac{1}{4}$ to $6\frac{3}{4}$ in the total length. *Eyes*—diameter from $4\frac{1}{4}$ to $5\frac{1}{4}$ in the length of head, 2 diameters from the end of snout, and $1\frac{1}{4}$ apart. The greatest width of the head is slightly less than its height, and equals its postorbital length. Mouth rather overhung by the snout: the maxilla reaches to below the front edge of the orbit. Lower labial fold very broad, uninterrupted. *Barbels*—a maxillary pair, which in the adult reach to the hind edge of the pre-opercle. *Teeth*—pharyngeal ones, 4, 3/3, 4. *Fins*—the dorsal situated midway between the snout and the base of the caudal fin, it has no osseous ray and is as high as the body below it. Pectoral as long as the head behind the nostril, and does not quite reach the ventral, which latter arises beneath the last few dorsal rays, and extends two-thirds of the distance to the base of the anal. Anal when laid flat reaches the base of the caudal, its base is $2\frac{1}{3}$ in its height. *Scales*—the tiled row small, not equalling 1/3 of the diameter of the eye. *Colours*—silvery, darkest on the back and upper half of the body, where most of the scales have dark edges. Upper surface of the

* 1. *Ptycobarbus laticeps*, Day, Proc. Zool. Soc. 1876, p. 789, Plate CXXV, f. 1. D. 10, L. l. 145. One pair of maxillary barbels. Lower jaw somewhat the longer: head very broad and mouth wide. Last undivided dorsal ray weak, entire. From Kashgar.

2. *Ptycobarbus longiceps*, Day, Proc. Zool. Soc. 1876, p. 790, and Fishes of Yarkand, Plate IV, f. 2, D. 12, A. 7, L. l. 112. Last undivided dorsal ray osseous and feebly serrated. From Yarkand.

head spotted with black. Some dark spots on the dorsal fin, and sometimes a few light ones on the caudal.

Habitat.—Head waters of the Indus and Tibet.

Genus, 8—DIPTYCHUS, *Steindachner.*

Abdomen rounded: snout obtuse: mouth inferior, transverse, curved: lower jaw sharp, with an internal horny covering: lips continuous and having an uninterrupted labial fold across the mandible. Two maxillary barbels. Gill-opening narrow. Pharyngeal teeth compressed 4, 3/3, 4. Dorsal fin without osseous ray, commencing anterior to the ventrals: anal short: caudal forked. Scales small, not imbricate but scattered along the upper two-thirds of the body, the thoracic region, the sides and the tail, also a scaly sheath to the vent and base of the anal fin. Lateral-line continued to the centre of the base of the caudal.

Geographical distribution.—Tibet, Nepaul, and Yarkand.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Diptychus maculatus.* D. 10-11, L. l. 80-90. Tibet, Nepaul, Yarkand.

1. Diptychus maculatus, Plate CXXIV, fig. 3.

Steind. Verh. zool.-bot. Ges. Wien, 1866, p. 788, t. 13, fig. 5; Günther, Catal. vii, p. 171; Day, Proc. Zool. Soc. 1876, p. 792.

? *Diptychus Sewerzowi*, Kess. Fish. Turkestan, p. 17, t. iv, f. 12.

B. iii, D. 10-11 ($\frac{2}{8}$-$\frac{3}{9}$), P. 19, V. 9, A. 7 ($\frac{2}{5}$), C. 19, L. l. 80-90.

Length of head 5 to 6, of caudal 5 to 6, height of body $7\frac{1}{2}$ to 8 in the total length. *Eyes*—diameter $4\frac{1}{2}$ in the young to 6 in the adult in the length of the head, $1\frac{1}{4}$ to 2 diameters from the end of the snout, and $1\frac{1}{2}$ apart. The greatest width of the head equals its height or its length behind the front edge or middle of the eyes. Mouth inferior, transverse, having an anterior sharp horny covering to the lower jaw. Lower labial fold interrupted in the middle. *Barbels*—one on the maxilla hardly so long as the eye. *Teeth*—pharyngeal 4, 3/3, 4, crooked and pointed. *Fins*—dorsal as high as the body, it arises rather nearer the snout than the base of the caudal fin, its last undivided ray articulated. Pectoral not quite so long as the head and reaching rather above half way to the ventral, which latter commencing below the last dorsal ray extends half way to the anal. Height of anal nearly three times the length of its base, laid flat it reaches the caudal. *Scales*—scattered over the upper two-thirds of the body and pectoral region. Tiled row well-developed. Free portion of tail one half longer than high at its base. *Colours*—bluish, lightest inferiorly, indistinctly blotched and spotted in the upper half of the body: often a narrow dull band along the lateral-line, and a second below it. In some specimens the dorsal and caudal fins are much spotted.

Habitat.—Head waters of the Indus, Tibet, Nepaul, and affluents of the Yarkand river.

Genus, 9—LABEO, *Cuvier.*

Bangana, pt. Ham. Buch.: *Rohita*, pt. Cuv. and Val.: *Tylognathus*,* Heckel: *Nandina*, Gray: *Hypselobarbus*, *Diplocheilus*, *Diplocheilichthys*, *Lobocheilus*, *Rohitichthys*, *Morulius*, *Schismatorhynchus*, and *Gobionichthys*, Bleeker: *Gobiobarbus*, Dybowski.

Body moderately elongated, abdomen rounded, mouth sometimes anterior but mostly inferior, transverse, and semi-oval. Lips thick, covering the jaws, continuous at the angle of the mouth, and one or both having an inner transverse fold. A soft and moveable horny covering with a sharp margin on the inner side of one or both lips. Snout rounded, generally projecting beyond the mouth, mostly covered with tubercles, and sometimes having a lateral lobe or projection. Barbels when present, four or two: if only one pair they are on the maxilla, the second being on the snout, or they may be absent.† Pharyngeal teeth hooked and in three rows, 5, 4, 2/2, 4, 5. Dorsal fin of moderate length or elongated, destitute of any osseous ray, and arising anterior to the commencement of the ventral. Anal short. Scales of large, moderate, or small size. Lateral-line running along the middle of the side of the tail. Gill-rakers usually short.

The horny layer, which is so common to the inside of the lips of the *Schizothoracinæ* is still perceptible in the fish of this Genus, in many of those of the plains taking on the character more of thin cartilaginous than a horny covering. The snout has sometimes a deep depression across it as observed in *Discognathus*.

The fins frequently increase in height and length more rapidly than do the proportions of the body; thus in adults we often perceive the upper edge of the dorsal fin more concave than in the young.

In some species having the least number of dorsal rays, the lips are much thinner than in the typical *Labeos*: should such have only two barbels they are maxillary, whereas in *Cirrhinas* they would be rostral.

* Dr. Günther (Catal. vii. p. 62), admitting the division of *Tylognathus* from *Labeo* is artificial, still adopts it for the following consistent reason, "by uniting these two Genera I should have been obliged to abandon the character of a long or short dorsal fin for the definition of other very natural Genera of Cyprinoids."

† As a rule the barbels in all specimens of a species are not subject to any variation in numbers, but *L. angra* appears to be an exception.

Geographical distribution.—Tropical Africa, Syria, throughout the fresh-waters of India, Ceylon, and Burma, to the Malay Archipelago, &c.

SYNOPSIS OF SPECIES.

1. *Labeo nandina*, D. 24-26, L. l. 42-44, L. tr. 6-7/8, 4 barbels. Bengal, Assam, and Burma.
2. *Labeo fimbriatus*, D. 19-22, L. l. 44-47, L. tr. 9-10/8-9, 4 barbels. Sind, Punjab, Deccan, probably N. E. Bengal, Orissa, and Southern India.
3. *Labeo nigrescens*, D. 17-18, L. l. 36, L. tr. 6/7, 4 barbels. Nearly black. Canara.
4. *Labeo calbasu*, D. 16-18, L. l. 40-44, L. tr. $7\frac{1}{2}$/8, 4 barbels. Slate colour. Throughout India and Burma.
5. *Labeo Stoliczkæ*, D. 17, L. l. 46-47, 2 maxillary barbels. Dark gray. Burma.
6. *Labeo gonius*, D. 16-18, L. l. 74-84, L. tr. 16/17, 4 barbels. Sind, Orissa, Bengal, N. W. Provinces, Assam, and Burma.
7. *Labeo Dussumieri*, D. 15-16, L. l. 53-55, L. tr. 8-9/9, 4 barbels. Western coast of India and Ceylon.
8. *Labeo rohita*, D. 15-16, L. l. 40-42, L. tr. $6\frac{1}{2}$/9, 4 barbels. Sind, Cutch, India (except Madras), Assam, and Burma.
9. *Labeo porcellus*, D. 15-16, L. l. 39, L. tr. 7/8, 4 barbels. Bombay and Poona.
10. *Labeo potail*, 14, L. l. 39-40, Deccan, L. tr. 8/7. A pair of maxillary barbels. Deccan.
11. *Labeo kontius*, D. 15-16, L. l. 38-41, L. tr. 7/8, 4 barbels. Southern India.
12. *Labeo cœruleus*, D. 14, L. l. 40, L. tr. 6/11, 2 barbels. Sind.
13. *Labeo diplostomus*, D. 13, L. l. 41-44, L. tr. 8/9. Mouth wide. Two barbels. Sind hills, Himalayas to Assam.
14. *Labeo dyocheilus*, D. 13, L. l. 43, L. tr. $8\frac{1}{2}$/$7\frac{1}{2}$, 2 barbels. Sind, Himalayas, Assam.
15. *Labeo pangusia*, D. 13, L. l. 40-42, L. tr. $7\frac{1}{2}$/8, 2 barbels. Sind, Himalayas, N. W. Provinces, Deccan, Cachar, and Assam.
16. *Labeo angra*, D. 12-13, L. l. 42, L. tr. 7/8, 2 or 4 barbels. Orissa, Bengal, Assam.
17. *Labeo bata*, D. 11-12, L. l. 37-40, L. tr. 7/7, 2 barbels. Bengal, Assam, Orissa.
18. *Labeo dero*, D. 12-13, L. l. 42, L. tr. 7/7, 2 barbels. Bengal, Assam, Orissa.
19. *Labeo boggut*, D. 12, L. l. 60, L. tr. 12-14. One pair of maxillary barbels. Bengal, the Deccan, Punjab, and Central India.
20. *Labeo boga*, D. 11-12, L. l. 37-39, L. tr. 7/7. One pair of small maxillary barbels. Silvery. Rivers of Gangetic Provinces, Madras, and Burma.
21. *Labeo nukta*, D. 11, L. l. 38, L. tr. 8/9. One pair of maxillary barbels: a deep groove across snout. Deccan.
22. *Labeo nigripinnis*, D. 11, L. l. 40-42, L. tr. 8/8, 2 barbels. Siud.
23. *Labeo Sindensis*, D. 12-13, L. l. 43, L. tr. 8/9, 2 barbels. Deccan, Sind, Punjab.
24. *Labeo ariza*, D. 11, L. l. 38, L. tr. 7/8, 2 barbels. Cauvery river in Madras.
25. *Labeo kawrus*, D. 11, L. l. 38, L. tr. 6/6, 2 barbels. Deccan.

1. Labeo nandina, Plate CXXVI, fig. 1 and 2 (variety *macronotus*.)

Cyprinus nandina, Ham. Buch. Fish. Ganges, pp. 300, 388, pl. 8, f. 84.
Cirrhinus nandina and *macronotus*, McClell. Ind. Cyp. pp. 265, 269, 318, 319, pl. 41, f. 1.
Rohita nandina, Cuv. and Val. xvi, p. 244, pl. 473.
Labeo nandina and *macronotus*, Günther, Catal. vii, pp. 51, 52.
Nandin, Beng.: *Nga-ohn-don*, *Nga-ne-pyah*, and *Nga-yin-pounsa*, Burmese.

B. iii, D. 24-26 ($\frac{2-3}{22-24}$), P. 15, V. 9, A. 7 ($\frac{2}{5}$), C. 19, L. l. 42-44, L. tr. 6-7/8.

Length of head $4\frac{1}{2}$ to 5, of caudal $4\frac{1}{4}$ to $4\frac{1}{2}$, height of body 4 in the total length. *Eyes*—diameter $4\frac{1}{2}$ to 5 in length of head, $1\frac{1}{2}$ diameters from end of snout, and $2\frac{1}{2}$ apart. Dorsal profile rather concave above the eyes: interorbital space flat. The greatest width of the head equals its length behind the angle of the mouth: the width of the mouth 1/3 of the length of the head. Snout obtuse, slightly projecting beyond the jaws, no lateral lobe: a few fine pores on snout. Lips thick and fringed, with a distinct inner fold above and below. Gill-rakers close together, about 1/3 as long as the eye. *Barbels*—four, and short. *Fins*—the dorsal commences midway between the snout and end of the base of the anal fin: its upper edge is somewhat convex. Ventral inserted below the ninth dorsal ray. Caudal deeply forked. *Lateral-line*—5 rows of scales between it and base of ventral fin. *Colours*—dark greenish above, becoming lighter on the sides and beneath: a few cloudy blotches along the sides: the centre of many of the scales reddish.

Variety *Labeo macronotus*, fig. 2. The eye in this form is abont 2 diameters from the end of snout, and 3 apart. The gill-rakers are likewise a little shorter and more widely placed. The number of dorsal rays appears to equally vary in both varieties.

Habitat.—Bengal, Assam, and Burma. The specimen of *L. nandina*, figured, was from Gowhatty in Assam: the one of *L. macronotus* was from Moulmein in Burma. I have obtained it as high up the Irrawaddy as Mandalay.

2. **Labeo fimbriatus,** Plate CXXVI, fig. 3.

Cyprinus fimbriatus, Bloch, xii, p. 50, pl. 409; Bl. Schn. p. 441.
Cyprinus nancar, Ham. Buch. Fishes of Ganges, pp. 299, 387; Cuv. and Val. xvi, p. 70.
Cirrhinus nancar, McClelland, Ind. Cyp. pp. 266, 325.
Rohita fimbriata and *Leschenaultii*, Cuv. and Val. xvi, pp. 261, 271.
Varicorhinus bobree, Sykes, Trans. Z. S. ii, p. 355, pl. 61, f. 3.
Leuciscus ? bobree, Bleeker, Beng. p. 25.
Cirrhinus fimbriatus and *Leschenaultii*, Jerdon, M. J. L. and Sc. 1849, pp. 304, 305.
Labeo fimbriatus and *Leschenaultii*, Günther, Catal. vii, p. 53.
Ven-candee, Tam.: *Ruchu* and *Gandumenu*, Tel.: *Bahrum*, Ooriah.

B. iii, D. 19-22 ($\frac{3-4}{15-18}$), P. 17, V. 9, A. 7 ($\frac{2}{5}$), C. 19, L. l. 44-47, L. tr. 9-10/8.

Length of head $6\frac{1}{4}$ to $6\frac{1}{2}$, of caudal 4 to $4\frac{1}{2}$, height of body 4 to $4\frac{1}{2}$ in the total length. *Eyes*—diameter $3\frac{3}{4}$ to $4\frac{1}{2}$ in the length of head, $1\frac{1}{4}$ to $1\frac{1}{2}$ diameters from the end of snout, and 2 apart. Dorsal profile more convex than that of the abdomen. The greatest width of the head equals its length excluding the snout. Width of the mouth $3\frac{1}{2}$ in the length of the head, and slightly overhung by the snout which is obtuse, rather swollen and studded with minute pores, but destitute of a lateral lobe. Lips thick, continuous and having an inner fold above and below, both fringed. A cartilaginous layer on the inner side of both jaws. *Barbels*—rostral and maxillary pairs short. *Teeth*—pharyngeal, 5, 3, 2/2, 3, 5. *Fins*—dorsal commences somewhat nearer the snout than to the base of the caudal, it is 2/3 as high as the body, its upper edge concave. Pectoral nearly as long as the head, it does not reach the ventral. The ventral nearly extends to the anal, and the latter to the caudal. Caudal deeply forked. *Lateral-line*—6 or 7 rows of scales between it and the base of the ventral fin. *Colours*—silvery along the back, becoming lighter on the sides and beneath. Fins, more especially the ventral, anal, and lower caudal lobe, stained with black. Sometimes a diffused dark blotch at the base of the caudal, and which is almost invariably present in the young.

The only difference observed between *L. nancar*, H.B. and *L. fimbriatus*, Bloch, is that the former is said to have "the edges of the lips smooth."

Habitat.—Sind, Punjab, the Deccan, and probably N. E. Bengal; also Southern India at least to Orissa, not recorded from Malabar or Canara. It attains a foot and a half in length, and is good eating, but bony.

3. **Labeo nigrescens,** Plate CXXVII, fig. 2.

Day, Proc. Zool. Soc. 1870, p. 371.
Mul-vel and *Kurri-minu*, Canarese.

B. iii, D. 17-18($\frac{2-3}{14-15}$), P. 19, A. 7($\frac{2}{5}$), C. 19-21, L. l. 36, L. tr. 6/7.

Length of head 5, of caudal $4\frac{1}{2}$ to 5, height of body $3\frac{1}{2}$ in the total length. *Eyes*—diameter 4 to 5 in the length of head, 2 diameters from the end of snout and also apart. The greatest width of the head equals its length excluding the snout, which last is rather swollen and rounded, and somewhat projecting over the lower jaw; a small lateral lobe; glands over the whole of the snout. A very distinct labial fold both above and below: a deep transverse groove across the chin: lower lip deeply fringed. *Barbels*—the maxillary ones as long as the orbit, the rostral rather shorter. *Fins*—upper edge of the dorsal fin nearly straight, it commences midway between the front end of the snout and the posterior end of the base of the anal fin. The pectoral reaches to above the ventral, the latter, which is inserted beneath the fourth dorsal ray, reaches to the anal. Anal rather elongated anteriorly, being 3/5 higher than its base is long, and if laid backwards it reaches the base of the caudal, which latter fin is deeply forked. *Scales*—$4\frac{1}{2}$ rows between the lateral line and base of the ventral fin. *Colours*—deep brown, each scale with a black spot at its base. Fins black.

Habitat.—Mangalore and South Canara. It is said to attain 18 inches in length.

4. **Labeo calbasu,** Plate CXXVI, fig. 4.

Cyprinus calbasu, Ham. Buch. Fish. Gang., pp. 297, 387, pl. 2, f. 83.
Cirrhinus calbasu, McClelland, Ind. Cyp., pp. 265, 320.
Cirrhina micropogon, Val. in Bél. Voy. Ind. Orient. p. 372, t. 3, f. 3.
Rohita calbasu and *Belangeri*, Cuv. and Val. xvi, pp. 253, 255; Bleeker, Beng. en Hind. p. 131, 132.
Rohita Reynauldi, Cuv. and Val. xvi, p. 247, pl. 474.
Labeo velatus, Val. in Cuv. Reg. An. Ill. Poiss. pl. 93, f. 3.
Cirrhinus Belangeri, and *affinis*, Jerdon, M. J. L. and Sc., 1849, p. 303.
Labeo calbasu, Günther, Catal. vii, p. 54; Day, Proc. Zool. Soc. 1869, p. 372.
Nulla-gandu-menu, Telugu: *Kalbasu* and *Kundna*, Beng. and *Cuggera* (Soane): *Mahlee*, Assam: *Kala-beinse*, Ooriah and Hind.: *Di*, Punj.: *Di-hee*, Sind: *Dai*, Cutch: *Kurri-minu*, Canarese: *Nga-nek-pya*, *Nga-noo-than*, and *Nga-ong-tong*, Burmese.

B. iii, D. 16-18($\frac{3}{13-15}$), P. 19, V. 9, A. 7($\frac{2}{5}$), C. 19, L. l. 40-44, L. tr. $7\frac{1}{2}$/8.

Length of head 5 to 6, of caudal 4 to 5, height of body 4 in the total length. *Eyes*—diameter 4 to 5 in the length of the head,* $1\frac{1}{2}$ to 2 diameters from end of snout, and $2\frac{1}{2}$ apart. Interorbital space nearly flat: width of head equals its length excluding the snout. Mouth rather narrow: snout obtuse and depressed, destitute of a lateral lobe but with pores. Lips thick, fringed (more especially the lower one), and each having a distinct inner fold. Gill-rakers very short. *Barbels*—four, the rostral slightly the longer, and about equal in length to the diameter of the orbit. *Teeth*—pharyngeal, crooked, 5, 4, 2-2, 4, 5. *Fins*—dorsal commences in advance of the ventrals, and midway between the snout and base of the caudal, its upper margin somewhat concave. Ventral commences below the fourth or fifth dorsal ray. Caudal deeply forked. *Lateral-line*—$5\frac{1}{2}$ to 6 rows of scales between it and the base of the ventral fin. *Colours*—blackish: sometimes, especially in examples from clear streams, many of the scales have a scarlet centre. Fins black, occasionally the end of the upper lobe of the caudal white.

In some districts, adults have very elongated fins, the first few dorsal rays reach even to the base of the caudal, the ventral extends to the end of the base of the anal, whilst the anal when laid flat reaches the middle of the caudal.

Habitat.—Punjab, Sind, Cutch, Deccan, Southern India and Malabar, from the Kistna through Orissa, Bengal, and Burma. It grows to 3 feet in length: were it not for its numerous bones, it would be excellent eating.

5. Labeo Stoliczkæ, Plate CXXXV, fig. 1.

? Labeo Reynauldi, Cuv. and Val. xvi, p. 351.
Labeo Stoliczkæ, Steindachner, Sitz. Akad. Wiss. 1870, p. 634.

B. iii, D. 15-16 $(\frac{3}{12-13})$, P. 19, V. 9, A. 7$(\frac{2}{5})$, C. 19, L. l. 44, L. tr. 9/13.

Length of head $4\frac{1}{3}$, of caudal $4\frac{3}{4}$, height of body 4 in the total length. *Eyes*—diameter $3\frac{1}{2}$ to 4 in the length of head, about 1 diameter from end of snout, and 2 apart. The greatest width of the head equals its length excluding the snout: interorbital space flat. Snout not swollen, destitute of a lateral lobe, and not overhanging the upper jaw. A deep groove across the chin, with a distinct labial fold. Lower lip very finely fringed. Pores on the snout. *Barbels*—a very short maxillary pair concealed in the labial fold. *Fins*—upper edge of dorsal fin concave, it commences midway between the end of the snout and the posterior extremity of the base of the anal fin, it is 2/3 as high as the body below it, and the length of its base equals its greatest height. Pectoral as long as the head excluding the snout: ventral inserted below the fifth dorsal ray. Anal laid flat does not reach the caudal, which is forked. *Lateral-line*—7 to 8 rows of scales between it and the base of the ventral fin. *Colours*—of a deep leaden-silvery along the upper half of the body, white shot with gold beneath. A black mark behind the gill-opening.

Habitat.—Irrawaddy river, and also Moulmein. The specimen figured (life-size) was from Prome.

6. Labeo gonius, Plate CXXVII, fig. 1.

Cyprinus curchius, *cursa*, *cursis*, and *gonius*, Ham. Buch. Fishes of Ganges, pp. 289, 290, 292, 387.
Cirrhinus gonius, McClelland, Ind. Cyp. pp. 266, 325.
Cyprinus (Labeo) curchius and *cursis*, McClelland, Ind. Cyp., pp. 268, 327, 329, pl. 40, f. 3, pl. 38, f. 2 and 3.
Rohita gonius and *cursis*, Cuv. and Val. xvi, pp. 259, 265.
Labeo microlepidotus, Cuv. and Val. xvi, p. 352; Günther, Catal. vii, p. 60.
Rohita chalybeata, Bleeker, Beng. en Hind. p. 133 (not C. V.)
Rohita microlepidota, Günther, Proc. Zool. Soc. 1861, p. 225.
Labeo cursa, Cuv. and Val. xvi, p. 361; Günther, l. c, p. 60.
Labeo curchius, Cuv. and Val. xvi, p. 363.
Labeo gonius, Day, Proc. Zool. Soc. 1869, p. 372.
Mosoo, Tel.: *Cursua*, Ooriah: *Kurchi* and *Goni*, Beng.: *Cursa* and *Colloose*, Hind.: *Courie* and *Bahtoor*, Assam: *Cir-re-oh*, Sind: *Nga-pay*, Tennass.: *Nga-dane*, and *Nga-hoo*, Burmese.

B. iii, D. 16-18$(\frac{2-3}{13-14})$, P. 17, V. 9, A. 7$(\frac{2}{5})$, C. 19, L. l. 74-84, L. tr. 16/17.

Length of head 5 to $5\frac{1}{2}$, of caudal 5 to $5\frac{1}{2}$, height of body 4 to $4\frac{1}{2}$ in the total length. *Eyes*—diameter $4\frac{1}{2}$ to 5 in the length of the head, $1\frac{1}{2}$ diameters from the end of snout, $2\frac{1}{2}$ apart. Dorsal profile more convex than that of the abdomen. The greatest width of the head equals its length excluding the snout. Mouth rather narrow, its width equalling $3\frac{1}{2}$ in the length of the head: no lateral lobe, but numerous pores on the snout. Lips thick, and with a distinct inner fold in their entire circumference, both of which are fringed. A cartilaginous covering to inner side of both jaws. *Barbels*—rostral and maxillary ones present but short. *Teeth*—pharyngeal, plough-shaped, 5, 4, 2/2, 4, 5. *Fins*—the dorsal commences much nearer the snout than the base of the caudal fin, it is 2/3 as high as the body, and its upper edge is concave. Pectoral nearly or as long as the head. Ventral commences under the middle of the dorsal. Caudal deeply forked. *Lateral-line*—

* In specimens $3\frac{1}{2}$ inches long, the eye is at least 1/3 of the length of the head, and the upper edge of the dorsal fin straight.

from 10 to 13 rows of scales between it and the base of the ventral fin. *Colours*—greenish along the back becoming lighter on the sides, scales darkest at their margins, many having red lunules on them.

In his MS. list of fish of the Rangpur district Hamilton Buchanan observes "the *Kurchha* of Goálpárá, by the people of Assam is called *Ghoni.*"

This fish is extensively used for the purpose of stocking tanks, and the four species mentioned by Hamilton Buchanan, I consider as varieties of one. At Calcutta the form *L. gonius* is most common with D. $\frac{2}{13}$, but I have seen two specimens with D. $\frac{2}{14}$ from that locality. In Orissa and Ganjam the rows of scales along the lateral-line are about 74, with only about 9 rows of scales between the lateral-line and base of the ventral fin. To the north, as at Seharanpore, the scales along the lateral-line only number 71, whilst there are 10 or 11 rows between it and the base of the ventral fin. In the Brahmaputra the form *L. gonius* is found as high as Gowhatty, where it mostly has D. $\frac{2}{14}$, with it is another form *G. cursis* with D. $\frac{2}{14}$, a rather higher body than is normal, and the scales in rather irregular rows, and some red spots on the sides, it has about 15 rows of scales between the lateral-line and base of the ventral fin.

Habitat.—Indus in Sind, through the N.W. Provinces, Bengal, and Orissa to Ganjam, as low as the Kistna: Assam and Burma. It attains nearly 5 feet in length.

7. **Labeo dussumieri**, Plate CXXVI, fig. 5.

Rohita Dussumieri, Cuv. and Val. xvi, p. 258, pl. 475; Day, Fishes of Malabar, p. 207.
Rohita Rouxii, Cuv. and Val. xvi, p. 270.
Cirrhinus Dussumieri and *Rouxii*, Jerdon, M. J. L. and Sc. 1849, p. 304.
Labeo Dussumieri and *Rouxii*, Günther, Catal. vii, pp. 55, 59.
Toolee, Mal.

B. iii, D. 15-16 ($\frac{3}{12-13}$), P. 17, V. 9, A. 7 ($\frac{2}{5}$), C. 19, L. l. 53-55, L. tr. 8-9/9.

Length of head $5\frac{3}{4}$ to 7, of caudal $4\frac{1}{2}$, height of body above 5, of dorsal fin 9 in the total length. *Eyes*—diameter 4 to $4\frac{1}{2}$ in length of head, $1\frac{1}{2}$ diameters from end of snout, and 3 apart. Interorbital space slightly convex. Body elongated and compressed, the abdominal profile rather more convex than the dorsal. Width of head equals its length behind the angle of the mouth. Mouth of moderate width and somewhat inferior, surrounded by fleshy, fringed lips, having a distinct inner fold above and below, but no lateral lobe. Sometimes numerous pores on the snout, extending posteriorly as far as the orbits, and below the nostrils. *Barbels*—four, minute. Gill-rakers very short. *Fins*—dorsal commences midway between the end of the snout, and end of base of anal fin, it is slightly in advance of the ventrals; its upper edge concave. Caudal very deeply forked. *Lateral-line*—5 or $5\frac{1}{2}$ rows of scales between it and the base of the ventral fin. *Colours*—grayish, lightest beneath, scales with a reddish centre, edged with a darker shade. Usually a dull diffused dark spot on either side of the tail. Fins dusky.

Habitat.—Rivers of South Malabar, Ceylon, and perhaps Bombay. It attains at least 13 inches in length.

8. **Labeo rohita**, Plate CXXVII, fig. 4.

Cyprinus rohita, Ham. Buch. Fish. Ganges, pp. 301, 388, pl. 36, f. 85; McClelland, Ind. Cyp. pp. 266, 391, pl. 41, f. 2.
Rohita Buchanani, Cuv. and Val. xvi, p. 251; Bleeker, Hind. en Beng. p. 133.
Rohita Duvaucelii, Cuv. and Val. xvi, p. 262.
Labeo fimbriatus, and *Dussumieri*, Cuv. and Val. xvi, pp. 350, 353.
Labeo rohita, Günther, Catal. vii, p. 55.
Ruhu, Ooriah: *Ruee*, Beng.: *Nga-myit-chin* and *Nga-myit-tsan-nee*, Burmese: *Dum-bra*, Sind.

B. iii, D. 15-16 ($\frac{3}{12-13}$), P. 17, V. 9, A. 7 ($\frac{2}{5}$), C. 19, L. l. 40-42, L. tr. $6\frac{1}{2}$/9.

Length of head $4\frac{1}{2}$ to 5, of caudal $4\frac{1}{2}$, height of body $4\frac{1}{2}$ in the total length. *Eyes*—diameter 4 to 6 in the length of the head, $1\frac{3}{4}$ to 2 diameters from end of snout, and 3 apart. Interorbital space flat. Dorsal profile more convex than that of the abdomen, it is somewhat concave over the orbit. The greatest width of the head equals its length excluding the snout. Width of mouth $3\frac{1}{4}$ in the length of the head. Snout obtuse, depressed, not or scarcely swollen, but projecting beyond the jaws: no lateral lobe: lips rather thick, fringed, and with a distinct inner fold above and below. Gill-rakers rather stiff, not closely set, about half as long as the eye. *Barbels*—a short and thin maxillary pair. A rostral pair are said to be sometimes present. *Teeth*—pharyngeal, plough-shaped, 5, 4, 3/3, 4, 5. *Fins*—the dorsal arises about midway between the snout and base of the caudal fin, it is not quite so high as the body, and its upper edge is moderately concave. Pectoral as long as the head excluding the snout. Ventral inserted below the third or fourth dorsal ray. Caudal deeply forked. *Lateral-line*—6 to $6\frac{1}{2}$ rows of scales between it and base of ventral fin. *Colours*—bluish or brownish along the back, becoming silvery on the sides and beneath; sometimes there is a red mark on each scale. In some specimens the fins are black.

Habitat.—Fresh-waters of Sind, and from the Punjab through India and Assam to Burma. It is not found in Madras or the Western coast. It attains 3 feet or more in length. It is esteemed excellent as food, and propagated with care in ponds in Bengal.

9. **Labeo porcellus**, Plate CXXVIII, fig. 1.

Tylognathus porcellus, Heckel, in Hügels Kashmir, iv, p. 385.
Labeo porcellus, Günther, Catalogue, vii, p. 54.

B. iii, D. 15-16 ($\frac{2}{13-14}$), P. 17, V. 9, A. 7 ($\frac{2}{5}$), C. 19, L. l. 39, L. tr. 7/8.

Length of head 6, of caudal $4\frac{1}{2}$, height of body $4\frac{1}{2}$ in the total length. *Eyes*—diameter 5 in the length of head, 2 diameters from the end of snout and also apart. Interorbital space rather convex. Dorsal profile rather more convex than that of the abdomen. The greatest width of the head equals its length excluding the snout. Width of the mouth equals 2/5 of the length of the head. Snout rather projecting. Lips thick, with a distinct inner fold to both jaws, which have each a thin cartilaginous internal covering. Gill-rakers small and rather closely set. *Barbels*—four, the maxillary rather longer than the rostral pair. *Fins*—dorsal not quite so high as the body, it commences somewhat in advance of the ventral, and midway between the snout and the posterior end of the base of the anal fin, its upper edge is rather concave. Pectoral as long as the head: ventral rather shorter. Caudal forked. *Lateral-line*—5 rows of scales between it and the base of the ventral fin. *Colours*—grayish superiorly, becoming dull white on the sides and beneath: most of the scales darkest at their edges. A dark spot, usually present, at the base of the caudal fin. A bluish spot behind the centre of the opercle, and which may be continued on to the shoulder. Fins grayish, darkest along their centres.

Habitat.—Poona and Bombay. The specimen figured (life-size) was from Poona.

10. **Labeo potail**, Plate CXXVII, fig. 3.

? Cyprinus potail, Sykes, Trans. Zool. Soc. ii, p. 354; Jerdon, M. J. L. and Sc. 1849, p. 302.
Leuciscus potail, Bleeker, Beng. p. 25.
Labeo potail, Day, Trans. Linn. Soc. Zool. 1876, p. 572.
Dotondi, Mahr.

B. iii, D. 13-14 ($\frac{2}{11-12}$), P. 17, V. 9, A. 7 ($\frac{2}{5}$), C. 19, L. l. 39-40, L. tr. 8/7.

Length of head $5\frac{1}{2}$, of caudal 4 to $4\frac{1}{2}$, height of body 4 to $4\frac{1}{2}$ in the total length. *Eyes*—situated in the commencement of the posterior half of the head, from 4 to 6 diameters in the length of the head. Interorbital space convex, and its width equals half the length of the head. Dorsal profile rather more convex than that of the abdomen. The greatest width of the head equals two-thirds of its length. Mouth narrow, its width being equal to 1/3 of the length of the head. Snout overhanging the mouth, with a slightly produced lateral-lobe: lower labial fold entire, a deep groove existing across the chin. Snout smooth, or with fine pores. A cartilaginous layer to inner side of both jaws. *Barbels*—a maxillary pair. *Fins*—dorsal commences rather nearer the snout than the base of the caudal fin, its upper margin is a little concave: the height of the fin two-thirds that of the body. Pectoral nearly as long as the head, and equals that of the ventral. Anal much highest anteriorly: caudal deeply forked, upper lobe the longer. *Lateral-line*—$5\frac{1}{2}$ rows of scales between it and base of the ventral. *Colours*—grayish, each scale with a red lunule, fins stained gray along their edges, and dorsal along its centre.

Sykes says *C. potail* has D. 13 ($\frac{3}{10}$), P. 14, no barbels. But I think he alluded to this species, which comes from the same locality.

Habitat.—Deccan, from Poona to the Tamboodra river. The specimen (10 inches long) was from Poona.

11. **Labeo kontius**, Plate CXXVII, fig. 5.

Cyprinus kontius, Jerdon, M. J. L. and Sc., 1849, p. 302.
Cirrhinus rubro-punctatus, Jerdon, loc. cit. p. 303.
Labeo kontius, Day, Proc. Zool. Soc. 1867, p. 289; Günther, Catal. vii, p. 55.
Currumunnee candee and *Curoo-moolee-candee*, Tam.

B. iii, D. 15-16($\frac{3-4}{12-13}$), P. 15, V. 10, A. 7($\frac{2}{5}$), C. 19, L. l. 38-41, L. tr. 7/8.

Length of head 6 to 7, of caudal $4\frac{1}{2}$, height of body $3\frac{3}{4}$ to 4 in the total length. *Eye*—in the immature it is usually in the middle of the length of the head, in the adult in the commencement of its last half, diameter $4\frac{3}{4}$ to 5 in the length of the head, 2 to $2\frac{1}{2}$ diameters from the end of snout, and $2\frac{1}{4}$ to $2\frac{1}{2}$ apart. Profile above the eyes rather concave, the interorbital space nearly flat: the greatest width of the head equals 3/4 of its length. Dorsal profile more convex than the abdominal. Muzzle blunt, truncated, covered with pores, and having a short fleshy lateral prolongation. Width of mouth $2\frac{1}{3}$ in the length of the head. Lips thick, with a distinct inner fold below, whilst the lower one is fringed. Snout overhanging the mouth. Gill-rakers widely set and about 1/3 of the diameter of the eye in length. *Barbels*—four, short. *Teeth*—pharyngeal, plough-shaped, 5, 4, 2-2, 4, 5. *Fins*—dorsal commences midway between the snout and hind end of the base of the anal, its upper margin is concave. Pectoral reaches to nearly above the ventral, whilst the latter does not reach the anal. Caudal deeply forked. *Lateral-line*—5 rows of scales between it and the base of the ventral. *Colours*—a general reddish or fleshy tinge, darkest along the back. In most of the specimens obtained from the Coleroon river, each scale had a red centre.

Habitat.—Rivers along the base of the Neilgherries, and the Cauvery and Coleroon in all their branches down to the coast. It grows to two feet in length.

12. Labeo cæruleus, Plate CXXIX, fig. 3.

B. iii, D. 14($\frac{2}{12}$), P. 18, V. 9, A. 7($\frac{2}{5}$), C. 19, L. l. 40, L. tr. 6/11.

Length of head $4\frac{3}{4}$, of caudal $4\frac{1}{2}$, height of body 4 in the total length. *Eyes*—4 diameters in the length of head, 1 diameter from the end of snout, and 2 apart. Interorbital space slightly convex. The greatest width of the head equals its length excluding the snout. Mouth narrow, its width equalling 2/7 of the length of the head. Snout overhanging the mouth: no lateral lobe. Lips continuous, and having a distinct inner fold in their entire circumference: both lips fringed. A horny inner covering to either lip. *Barbels*—no rostral ones, a short pair to the maxilla. *Fins*—dorsal arises anterior to the ventral, and slightly nearer to the end of the snout than the base of the caudal fin, anteriorly 2/3 as high as the body, its upper edge concave. Pectoral as long as the head excluding the snout, it does not reach the ventral nor the latter the anal. Anal when laid flat reaches the base of the caudal which is deeply forked. *Lateral-line*—6 rows of scales between it and the base of the ventral fin. *Colours*—bluish with a yellowish tinge on the sides and beneath. Outer half of anal nearly black, and a blackish lunule on the caudal.

Habitat.—River at the base of the Sind Hills. A single specimen obtained, which is figured life-size.

13. Labeo diplostomus, Plate CXXIX, fig. 2.

? Cyprinus dero, Ham. Buch. Fish. Ganges, pp. 277, 331, 385, pl. 22, fig. 78 *(young)*.
Varicorhinus diplostomus, Heck., Fish. Kaschmir, p. 67, t. 11.
Cyprinus (Bangana) falcata, Gray and Hard. Ill. Ind. Zool.
Gobio malacostomus, McClelland, Ind. Cyp. p. 280.
Labeo diplostomus and *malacostomus*, Cuv. and Val. xvi, pp. 360 and 365; Günther, Catal. vii, p. 57.
Tylognathus Valenciennesii, Heckel, in Hügel's Reise, iv, p. 378, and in Russ. Reisen, ii, p. 283.
Gobio ricnorhynchus, McClelland, Ind. Cyp., pp. 279, 363, pl. 55, f. 1; Cuv. and Val. xvi, p. 464.
Lobocheilos ? falcatus and *ricnorhynchus*, Bleeker, Beng. p. 66.
Labeo ricnorhynchus, Günther, Catal. vii, p. 57; Day. Proc. Zool. Soc. 1869, p. 373.
Nepura, Assam; *Kul-ka-batta*, Beng.; *Gid* and *Giddah*, Punj.; *Mohaylee*, Hind. (Hurdwar) and *Gaywah*, Scharanpore.

B. iii, D. 12-13 ($\frac{2-3}{9-10}$), P. 17, V. 9, A. 7 ($\frac{2}{5}$), C. 19, L. l. 41-44, L. tr. 8/9.

Length of head $5\frac{1}{2}$ to $6\frac{1}{4}$, of caudal 5, height of body 5 to $5\frac{1}{2}$ in the total length. *Eyes*—situated either in, or (in the young) rather before the middle of the length of the head, diameter 5 to $6\frac{1}{2}$ in the total length of head, and $2\frac{1}{2}$ to 3 diameters apart. Greatest width of the head equals its length excluding the snout. Dorsal profile more convex than that of the abdomen. Mouth rather narrow, snout overhanging the jaws, generally with a groove across it, and covered with pores: no lateral lobe. Lips thick and continuous, but the fold across the lower jaw is interrupted. A cartilaginous layer on inside of both lips. Gill-rakers, closely set, about 1/3 as long as the eye. *Barbels*—a small maxillary pair. *Teeth*—pharyngeal, plough-shaped, 5, 4, 2/2, 4, 5. *Fins*—dorsal arises midway between the front of the snout and the end of the base of the anal fin, its upper edge is slightly concave in the young, becoming deeply so in the adult. Pectoral does not extend to the ventral, nor the latter to the anal. Caudal deeply forked, the upper lobe the longer: its central rays being about 1/3 the length of the outer ones in the young, 2/7 in the adult. *Scales*—6 to 7 rows between the lateral-line and base of the ventral fin. *Colours*—grayish, darkest along the back, each scale tinged with red: a darkish band along the side, or short gray bars passing to the lateral-line. Fins with a faint reddish hue. Outer edge of dorsal rather stained.

Hamilton Buchanan l.c. observes of *C. dero* "at each corner of the mouth is a minute tendril," thus showing the figure to be incorrect on this point. I have the young from Goalpara having the same proportions as given in H. B.'s figure. The specimen in the British Museum, Catal. of *Cirrhina dyochila*, "*a.* $4\frac{1}{2}$ inches long. Cachar," is likewise identical.

Habitat.—Along the Sind hills and Himalayas, also in the Brahmaputra in Assam.

14. Labeo dyocheilus, Plate CXXX, fig. 1.

Cyprinus dyocheilus, McClelland, Ind. Cyp. pp. 268, 330, t. 37, fig. 1; Cuv. and Val. xvi, p. 461.
? Gobio bicolor, McClelland, l. c. pp. 278, 360, t. 40, f. 1; Cuv. and Val. xvi, p. 462.
Cirrhina dyocheilus, Günther, Catal. vii, p. 37.
Labeo falcatus, Günther, Catal. vii, p. 58 (not Bloch, or Gray and Hardwicke).
Boalla, Hind.; *Heel-gorya*, Assamese; *Nu-ga-dee*, Sind.

B. iii, D. 13 ($\frac{2}{11}$), P. 17, V. 9, A. 7 ($\frac{2}{5}$), C. 19, L. l. 43, L. tr. $8\frac{1}{2}/7\frac{1}{2}$.

Length of head 5 to $5\frac{1}{2}$, of caudal $5\frac{1}{2}$, height of body $3\frac{3}{4}$ to $4\frac{1}{2}$ in the total length. *Eyes*—situated in the commencement of the posterior 1/2 of the head in the young, still further back in the adult: diameter from 6 to 9 in the length of the head, and from $3\frac{1}{2}$ to 5 apart. Width of head equals 2/3 of its length: its lower surface being very broad and flat. Snout conical, projecting, and with a distinct lateral lobe (in General

Hardwicke's figure there is a depression across the snout.) Mouth wide, equalling 1/2 to 2/5 the length of the head, it is directed downwards when the upper jaw is protruded. Lips of two jaws continuous, the fold across the lower jaw is interrupted. A horny inner covering to both lips. Pores on snout. Gill-rakers short. *Barbels*—one pair of short maxillary ones. *Teeth*—pharyngeal, plough-shaped, 5, 4, 3/3, 4, 5. *Fins*—dorsal commences midway between the end of the snout and the posterior end of the base of the anal fin, its upper margin concave, especially in the adult. Pectoral reaches the ventral, and the latter the base of the anal. Caudal deeply forked, its inner rays equalling about 1/3 of the length of the outer ones. *Lateral-line*—5 rows of scales between it and the base of the ventral fin. *Colours*—of a dull green, darkest above: fins darkest in the centre.

I have Sind specimens in which there exists a depression across the snout.

Habitat.—Sind hills and along the Himalayas to Sikkim and Assam. It is common in Assam. It attains at least 3 feet in length.

15. Labeo pangusia, Plate CXXXI, fig. 1.

Cyprinus pangusia, Ham. Buch. Fishes of Ganges, pp. 285, 386; Cuv. and Val. xvi, p. 429.
Gobio pangusia, McClell. Ind. Cyp. pp. 279, 362, pl. 42, f. 1 (from H. B.'s MSS.)
Labeo pangusia, Günther, Catal. vii, p. 58.
Loannee, Beng.

B. iii, D. 13 ($\frac{2}{11}$), P. 15, V. 9, A. 7 ($\frac{2}{5}$), C. 19, L. l. 40-42, L. tr. $7\frac{1}{2}$/8.

Length of head $5\frac{2}{3}$ to 6, of caudal $4\frac{1}{2}$ to 5, height of body $4\frac{1}{2}$ in the total length. *Eyes*—diameter $4\frac{1}{2}$ to $5\frac{1}{2}$ in the length of the head, and in or rather behind the middle of the length of the head. Dorsal profile more convex than that of the abdomen: body rather compressed. The greatest width of the head equals 2/3 of its length. Mouth narrow, its width equal to $3\frac{3}{4}$ in the length of the head. Snout obtuse, projecting over the jaws and having a very distinct lateral lobe. Lips not fringed, but thick, with a distinct inner fold which is not continued across the lower jaw. Snout covered with large pores. A cartilaginous covering to inner surface of both lips. Gill-rakers short and closely set. *Barbels*—a short maxillary pair, concealed in the labial fold. *Teeth*—pharyngeal, plough-shaped, 5, 4, 3/3, 4, 5. *Fins*—dorsal commences nearer the snout than the base of the caudal, it is nearly or quite as high as the body, and in the adult its upper edge is concave. Pectoral does not quite reach the ventral, nor the latter the anal. Caudal deeply forked. *Lateral-line*—$5\frac{1}{2}$ to 6 rows of scales between it and the base of the ventral fin. *Colours*—of a dull green, becoming lighter on the sides and beneath, sometimes the base of each scale has a dark mark.

There is a variety of this fish at Seharanpore with a much higher body.

Habitat.—Himalayan range and generally through Sind, the Deccan, N. W. Provinces, to Bengal, Cachar and Assam. I have obtained it in the Himalayas at Kangra, and as high in Assam as Suddya.

16. Labeo angra, Plate CXXVIII, fig. 2.

Cyprinus angra, Ham. Buch. Fish. Ganges, pp. 331, 391.
? *Cyprinus morala*, *pausius* and *musiha*, Ham. Buch. l. c. pl. 18, f. 91, and pp. 332, 392; Cuv. and Val. xvi, p. 439.
Cyprinus (*Bangana*) *Hamiltonii*, Gray and Hard. Ill. Ind. Zool. (from H. B.'s MSS.)
? *Gobio angra*, Cuv. and Val. xvi, p. 319 (not McClelland).
Gobio boga, Bleeker, Beng. en Hind. p. 134.
Labeo morala, Günther, Catal. vii, p. 56.
Nga-loo, Burmese; (*Khārsá*, Hind. at Purniah; *Mochhna* on the Mahanunda, H. B.'s MSS.)

B. iii, D. 12-13 ($\frac{2-3}{10}$), P. 16, V. 9, A. 7 ($\frac{2}{3}$), C. 19, L. l. 42, L. tr. 7/8.

Length of head $5\frac{3}{4}$, of caudal $4\frac{1}{3}$, height of body $5\frac{1}{4}$ in the total length. *Eyes*—diameter $3\frac{1}{2}$ to $4\frac{1}{2}$ in the length of the head, $1\frac{1}{4}$ to $1\frac{3}{4}$ diameters from the end of the snout, and 2 to $2\frac{1}{2}$ apart. Dorsal profile a little more convex than that of the abdomen. Snout overhanging the jaws, having a distinct lateral lobe on either side, and studded with pores. Mouth rather narrow, the lips continuous and with a deep groove across the chin: both lips fimbriated. *Barbels*—no rostral, but a short maxillary pair. *Fins*—dorsal as high as the body, arising rather nearer the snout than the base of the caudal fin, its upper edge concave. Pectoral nearly as long as the head. Ventral inserted beneath the first third of the dorsal. Caudal deeply forked. *Lateral-line*—$5\frac{1}{2}$ rows of scales between it and the base of the ventral fin. *Colours*—brownish along the back, with a black or bluish stripe passing from the eyes to the base of the caudal fin, where it ends in a black blotch. In Burmese examples the black lateral band is wanting, but the blotch at the side of the tail is present, and some have a second blotch at the commencement of the lateral-line. Instead of a maxillary barbel there exists a fleshy flap inside the groove.

Gobio angra, McClelland (pp. 277, 354) is said to have D. 10, L. l. 35, L. tr. 14 to base of ventral fin; the specimen, from which his description was drawn up, was apparently *Cirrhina reba*, which frequently in Assam has a dark line along the body and is termed *Lasseem*, which McClelland observes was the name of his fish.

Hamilton Buchanan divided *C. morala* from *C. angra*, as in the latter the eyes are red, the minute first

dorsal ray is wanting, and it has two instead of four barbels. The long barbels shown in the figure are evidently due to an artistic error, as he says, "the *tendrils* are minute;" and in his MSS. he observes that one species scarcely differs from the other "in anything but the colours."

The specimen of *Tylognathus boga*, "*a.* young. River Hooghly," mentioned in the British Museum Catal. vii, p. 64, is this species.

Habitat.—Assam, Bengal, and Orissa. Also Mandalay in upper Burma, and Sittoung in British Burma.

17. **Labeo bata**, Plate CXXIX, fig. 5.

Cyprinus bata, acra and *cura*, Ham. Buch. Fish. Ganges, pp. 283, 284, 386: Cuv. and Val. xvi, pp. 427, 428.

Gobio lissorhynchus and *anisurus*, McClelland, Ind. Cypr. pp. 277, 278, 355, 360, pl. 40, f. 2, and pl. 55, f. 5; Cuv. and Val. xvi, p. 463.

Cirrhina anisura, Steind., Sitz. Ak. Wiss., Wien, 1867, lvi, p. 66; Günther, Catal. vii, p. 37.

Crossocheilus bata, Day, Proc. Zool. Soc., 1869, p. 371.

Dungula-porah, Ooriah: *Dommarci-batta*, Beng.; *Gootellah*, Hind.: *Bango*, N.W. Prov.: *Tchirri*, Cutch.

B. iii, D. 11-12 ($\frac{2-3}{9-10}$), P. 18, V. 9, A. 7($\frac{2}{5}$), C. 19, L. l. 37-40, L. tr. 7/6-7.

Length of head $5\frac{1}{2}$ to $5\frac{3}{4}$, of caudal 5 to $5\frac{1}{2}$, height of body $4\frac{1}{3}$ to $4\frac{3}{4}$ in the total length. *Eyes*—diameter 4 to $4\frac{1}{3}$ in the length of head, $1\frac{1}{4}$ to $1\frac{1}{3}$ diameters from the end of snout, 2 to $2\frac{1}{2}$ apart. The dorsal profile more convex than that of the abdomen: the greatest width of the head equals its length excluding the snout. The width of the mouth equals $3\frac{1}{3}$ in the length of the head, and in the adult is about three times as wide as the cleft is deep: snout slightly in advance of the jaws in the young but hardly so in the adult, when it is often covered with pores. Lips thin, continuous, the lower reflected from off the mandible, and with a shallow groove along its hind edge. A tubercle inside lower jaw above the symphysis. No horny covering inside jaws. *Barbels*—a pair of very short maxillary ones. *Teeth*—pharyngeal, plough-shaped or molariform, 5, 3, 2/2, 3, 5. *Fins*—the dorsal as high as the head is long, and with a concave upper edge, it commences slightly nearer the end of the snout than the base of the caudal fin. Pectoral about as long as the head and reaches the ventral which is rather shorter. Caudal deeply forked. *Lateral-line*—$5\frac{1}{2}$ rows of scales between it and the base of the ventral fin. *Colours*—vary with the age of the fish: generally silvery, darkest along the back, and with the lower fins stained orange: fine black dots on all the fins. When about four inches long, there are three or four small black spots on the fifth and sixth scales of the lateral-line, which gradually and almost entirely fade as age advances.

I have obtained a variety in Assam with the same number of rays and scales, but a more prominent snout, and with the lower lip fimbriated.

Habitat.—From the Kistna and Godavery rivers, through Orissa, Lower Bengal, and Assam. As this fish (which attains nearly two feet in length) is extensively used for stocking tanks, it is not improbable, as suggested by McClelland, that the three varieties mentioned by Hamilton Buchanan refer to one species.

18. **Labeo microphthalmus**, Plate CXXXII, fig. 4.

Labeo diplostomus, Beavan, Proc. Zool. Soc. 1872, p. 150, c. fig. (not Heckel).

B. iii, D. 13($\frac{3}{10}$), P. 18, V. 9, A. 7($\frac{2}{5}$), C. 19, L. l. 41-43, L. tr. 8/9.

Length of head 6, of caudal $4\frac{2}{3}$ to 5, height of body $5\frac{1}{4}$ to $5\frac{3}{4}$ in the total length. *Eyes*—diameter $5\frac{1}{2}$ in the length of the head, 2 diameters from the end of snout, and $2\frac{1}{4}$ apart. Dorsal profile more convex than that of the abdomen. Snout overhanging the mouth, but not swollen, having a very indistinct lateral lobe: some specimens have a few small pores on the snout. Lips continuous: the groove across the lower jaw interrupted: mouth transverse, inferior: a cartilaginous or horny covering to inside of the lower jaw. The suborbital ring of bones comparatively wide being 2/3 that of the orbit. *Barbels*—a short maxillary pair. *Teeth*—pharyngeal, plough-shaped 5, 4, 2/2, 4, 5. *Fins*—the height of the dorsal equals or exceeds the length of the head, its upper edge is very concave, it arises midway between the end of the snout and the posterior extremity of the base of the anal fin. Pectoral does not reach the ventral. Caudal deeply forked. *Scales*—$6\frac{1}{2}$ rows between the lateral-line and base of the ventral fin. The scales covering the thorax are very small, *Colours*—silvery, darkest in the upper half of the body: sometimes the scales are marked with red.

Lieut. Beavan's specimen from Murree of *L. diplostomus* is the above species, it is named in MSS. *Labeo Jerdoni*, at the British Museum.

Habitat.—Himalayas, from the Punjab, Murree and Kangra, also Cashmere.

19. **Labeo boggut**, Plate CXXVIII, fig. 4.

Chondrostoma boggut, Sykes, Trans. Zool. Soc. ii, p. 359; Bleeker, Beng. p. 25; Jerdon, M. J. L. and Sc. 1849, p. 309.

Tylognathus striolatus, Günther, Catal. vii, p. 62.

Kolees, Mahr.: *Loi*, Cutch.

B. iii, D. 11-12($\frac{3}{8-9}$), P. 17, V. 9, A. 7($\frac{2}{5}$), C. 19, L l. 60-65, L. tr. 11-12/14.

Length of head $5\frac{1}{2}$ to 6, of caudal $4\frac{1}{2}$, height of body $5\frac{1}{2}$ to $6\frac{1}{4}$ in the total length. *Eyes*—diameter $4\frac{1}{2}$ to 5 in the length of head, $1\frac{1}{2}$ to $1\frac{3}{4}$ diameters from the end of snout, and 2 apart. Dorsal profile rather

more convex than that of the abdomen. The greatest width of the head equals its length excluding the snout. Interorbital space convex. Snout thick, somewhat projecting beyond the jaws, but without any lateral lobe.* A few pores on the snout. Lower labial fold complete: lower lip fimbriated: a horny covering to the inside of the lower lip. Gill-rakers very short and widely set. *Barbels*—a short maxillary, but no rostral pair. *Fins*—the dorsal commences nearer to the snout than the root of the caudal, it is as high as the body, its upper edge concave. Pectoral nearly as long as the head and does not reach the ventral, which latter is inserted under the middle dorsal rays. Ventral does not extend to the anal, nor the latter to the caudal which is deeply forked. *Lateral-line*—8 to 9 rows of scales between it and the base of the ventral fin. *Colours*—silvery, darkest superiorly. Fins orange. In some specimens a few light lines run along the sides, or a bluish band along the body. A dark spot usually present near the base of the caudal, and sometimes a smaller one on the lateral-line above the last third of the pectoral fin.

In specimens from the Hooghly the barbels are very minute.

Habitat.—Bengal, the Punjab, Central Provinces, Bombay, the Deccan, numerous at Jubbulpore and Cutch, also found at Madras. The specimen figured was from Poona. It attains at least $7\frac{1}{2}$ inches in length.

20. Labeo boga, Plate CXXVIII, fig. 3, and CXXXI, fig. 4.

? *Cyprinus falcatus*, Bloch, t. 412: Bl. Schn. p. 441.
Cyprinus boga, Ham. Buch. Fish. Ganges, pp. 286, 386, pl. 28, f. 80; Cuv. and Val. xvi, p. 432.
Gobio boga, McClell., Ind. Cyp. pp. 278, 361.
? *Chondrostoma semivelatus*, Cuv. and Val. xvii, p. 402; Günther, Catal. vii, p. 76.
Cirrhina boga, Steind. Sitz. Ak. Wiss. Wien, 1867, p. 64.
Kinda-meen, and *Coal-arinza-candee*, Tam.: *Ariza*, Tel.; *Kala-buttali*, Ooriah: *Bangum-batta*, Beng.: *Morah*, Punj.: *Kyouk-nya-loo*, Burm.

B. iii, D. 11-13($\frac{2-3}{9-10}$), P. 16, V. 9, A. 7($\frac{2}{5}$), C. 19, L. l. 37-39, L. tr. $6\frac{1}{2}$-7/7, Vert. 17-15.

Length of head $5\frac{1}{4}$ to $5\frac{1}{2}$, of caudal 5, height of body $5\frac{1}{2}$ to $5\frac{3}{4}$ in the total length. *Eyes*—somewhat before the middle of the length of the head, $3\frac{3}{4}$ to 4 diameters in the length of head, 1 to $1\frac{1}{4}$ diameters from the end of snout, and $1\frac{1}{2}$ apart. Dorsal profile rather more convex than that of the abdomen. The greatest width of the head equals its length excluding the snout. Mouth rather narrow, its width equalling 1/3 of the length of the head. Snout moderately projecting beyond the jaws, no lateral lobe. Lips rather thick, the lower being reflected from off the mandible and internally roughened. A thin layer of cartilage to inner surface of lower lip. Snout occasionally covered with large pores. *Barbels*—two minute maxillary ones. *Teeth*—pharyngeal, 5, 4, 3/3, 4, 5, plough-shaped. *Fins*—origin of dorsal considerably in advance of the ventrals, it is as long or longer than the head and commences nearer the snout than the base of the caudal, upper margin concave; caudal deeply forked, lobes of equal length. *Lateral-line*—5 rows of scales between it and the base of the ventral fin. *Colours*—orange, with the fins of a reddish tinge: sometimes a dark spot on the shoulder.

This may be *Chondrostoma Duvaucellii*, Cuv. and Val. It is allied to *L. bata*, but has a larger eye, a much lower body, a higher dorsal fin, whilst the lower jaw is not so much bent upwards anteriorly.

There is a variety of this fish in upper Burma having the head more compressed, and only $4\frac{1}{2}$ rows of scales between the lateral-line and base of the ventral fin.

Habitat.—Rivers of Gangetic Provinces, Madras, and Burma: said to attain a foot in length. Pl. cxxviii, f. 3, is from a Burmese specimen, and Plate cxxxi, f. 4. is an example from the Jumna.

21. Labeo nukta, Plate CXXVIII, fig. 5.

Cyprinus nukta, Sykes, Trans. Zool. Soc. ii, p. 325; Jerdon, M. J. L. and Sc. 1849, p. 303.
Carassius auratus, pt. Günther, Catal. vii, p. 32 (not syn.)
Labeo nukta, Day, Journ. Asi. Soc. of Bengal, 1872, Vol. XLI, p. 319.

B. iii, D. 11 ($\frac{2}{9}$), P. 15, V. 9, A. 7 ($\frac{2}{5}$), C. 19, L. l. 37-38, L. tr. 6/9.

Length of head 5 to $6\frac{1}{4}$, of caudal $4\frac{1}{4}$ to 5, height of body $4\frac{1}{2}$ in the total length. *Eyes*—diameter 6 in the length of the head, $2\frac{1}{2}$ diameters from the end of snout, and also apart. The greatest width of the head equals its length excluding the snout. Snout projecting over the mouth, and having a deep groove passing from one orbit to the opposite one, thus occasioning the appearance as if there were a blunt compressed knob between and before the orbits. Mouth transverse, of moderate width: the snout with a well-developed lateral lobe and a distinct inner fold to the lips at the angle of the mouth, and extending across the outer third of the lower jaw, from which the lip is reflected and studded with pores, but neither lips are fringed. Both lips with a thin deciduous horny layer internally. Some large pores on snout, forehead, and in the rostral groove. Gill-rakers closely set and short. *Barbels*—a rudimentary maxillary pair. *Lateral-line*—badly marked, $4\frac{1}{2}$ rows of scales between it and the base of the ventral fin. *Fins*—dorsal arises midway between the snout and posterior extremity of the base of the anal fin, its anterior three rays are much elevated and higher than the body, the last besides being divided to its root is also somewhat prolonged, making the upper margin

* Some Cutch specimens have a groove across the snout, whilst their bodies are rather elongated. There is a very distinct ridge inside the mouth over the symphysis of the lower jaw, more especially seen in the young.

of the fin concave: ventral arises under the middle of the dorsal and scarcely reaches the anal, which fin is much highest anteriorly. Pectoral as long as the head. Caudal deeply forked. A row of scales along the base of the dorsal. *Colours*—silvery, with some red marks on the scales. Fins reddish, caudal edged with gray.

Habitat.—Poona and rivers of the Deccan. It attains at least 12 inches in length.

22. Labeo nigripinnis, Plate CXXXII, fig. 3.

B. iii, D. 11 ($\frac{2}{9}$), P. 17, V. 9, A. 7 ($\frac{2}{5}$), C. 19, L. l. 40-42, L. tr. 8/8.

Length of head 5 to $5\frac{1}{4}$, of caudal $4\frac{1}{2}$ to 5, height of body $5\frac{1}{4}$ to $5\frac{3}{4}$ in the total length. *Eyes*—situated in the middle of the length of the head in the young, rather before it in the adult, diameter $4\frac{1}{3}$ in the length of the head, $1\frac{1}{3}$ diameters from the end of snout, and $1\frac{3}{4}$ apart. Dorsal profile somewhat elevated, abdominal nearly straight: the greatest width of the head equals its length behind the middle of the eyes. Snout projecting over the mouth which is inferior, and its width equals one-third of the length of the head, the lips continuous at the angle of the mouth: the lower lip thin and reflected from off the mandible, which has a thin cartilaginous covering. Large pores on the snout, which in some specimens has a groove across it. *Barbels*—a minute maxillary pair. *Fins*—dorsal commences midway between the end of the snout and the posterior extremity of the base of the anal fin, it is as high as the body and has a concave upper edge. Pectoral as long as the head excluding the snout, or even a little more. Ventral commences below the first third of the dorsal. Caudal deeply forked. *Lateral-line*—from 5 to $5\frac{1}{2}$ rows of scales between it and the base of the ventral fin. *Colours*—bluish along the back, becoming dull white on the sides and beneath. In some specimens the bases of the scales are dark coloured, some have a dull band along the side. Fins black in the adult, not always so in the young.

Habitat.—Sind hills and rivers at their bases.

23. Labeo Sindensis, Plate CXXXII, fig. 2.

Cirrhina Sindensis, Day, Proc. Asi. Soc. of Bengal, 1872, Vol. XLI, p. 319.

B. iii. D. 12-13 ($\frac{2-3}{10}$), P. 18, V. 9, A. 7 ($\frac{2}{5}$), C. 19, L. l. 43, L. tr. 8/9.

Length of head $6\frac{1}{4}$, of caudal $4\frac{1}{2}$, height of body $5\frac{1}{4}$ in the total length. *Eyes*—rather nearer snout than hind edge of opercles, diameter $5\frac{1}{2}$ in the length of the head, 2 diameters from the end of snout and $2\frac{1}{2}$ apart. Dorsal profile rather more convex than that of the abdomen. The greatest width of the head equals its length excluding the snout. Snout rather overhanging the mouth. Interorbital space slightly convex: no lateral lobe to snout, which in some specimens has a deep groove across it, and is covered with glands. Lips continuous at the angle of the mouth; the lower lip thin with a smooth edge, and reflected from off the mandible which has a thin cartilaginous covering. *Barbels*—a short maxillary pair. *Fins*—dorsal commences midway between the end of the snout and the posterior extremity of the base of the anal, it is rather higher than the body, its upper edge concave. Pectoral as long as the head excluding the snout. Ventral inserted under the middle of the dorsal fin. Caudal deeply forked. *Lateral-line*—$6\frac{1}{2}$ to 7 rows between it and the base of the ventral fin. *Colours*—silvery, with a reddish tinge, the bases of the scales darkest: fins reddish.

Habitat.—Sind, the Punjab (at Lahore and Hurdwar), also the Deccan at Poona. This fish is allied to *L. bata*, but differs in its much smaller eye, larger number of scales, &c. It attains at least 8 inches in length.

24. Labeo ariza, Plate CXXXII, fig. 5.

Cyprinus ariza, Buchanan, Journey Mysore, iii, p. 344, pl. 31, and Fish. Ganges, pp. 286, 386; McClelland, Ind. Cyp. pp. 279, 357; Cuv. and Val. xvi, p. 430.

Gobio Hamiltonii and *Bovianus*, Jerdon, M. J. L. and Sc. 1849, p. 307.

Tylognathus ariza, Günther, Catal. vii, p. 63.

B. iii, D. 11 ($\frac{2}{9}$), P. 18, V. 9, A. 7-8 ($\frac{2-3}{5}$), C. 19, L. l. 38, L. tr. 6-7/8.

Length of head $5\frac{1}{4}$ to $5\frac{1}{2}$, of caudal $5\frac{1}{4}$, height of body 4 to $4\frac{1}{2}$ in the total length. *Eyes*—rather nearer snout than hind edge of opercle, diameter $5\frac{1}{2}$ in the length of the head, 2 diameters from the end of snout, and $2\frac{1}{2}$ apart. Dorsal profile slightly more convex than that of the abdomen. Interorbital space nearly flat. The greatest width of the head equals its length behind the middle of the eyes: the width of the mouth equals 1/3 of the length of the head. Lips smooth, with a thin cartilaginous covering inside the lower jaw. A few pores on snout. *Barbels*—no rostral ones, a very short pair of maxillary ones. *Fins*—dorsal commences slightly nearer the snout than the base of the caudal fin, it is 3/4 as high as the body, and has a concave upper margin. Pectoral nearly as long as the head. Ventral inserted below the anterior third of dorsal fin, and not so long as the pectoral. Caudal deeply forked. *Lateral-line*—$5\frac{1}{2}$ rows between it and base of the ventral fin. *Colours*—leaden gray superiorly, becoming silvery on the sides and beneath.

Habitat.—Wynaad and Bowany river at the foot of the Neilgherry hills in Madras, also the Cauvery river. It attains to about $9\frac{1}{2}$ inches in length.

25. **Labeo kawrus**, Plate CXXXI, fig. 5.

? *Chondrostoma kawrus*, Sykes, Trans. Zool. Soc. ii, p. 358, pl. 62, f. 2; Bleeker, Beng. p. 25; Jerdon, M. J. L. and Sc. 1849, p. 308.

B. iii, D. 11($\frac{2}{9}$), P. 17, V. 9, A. 7($\frac{2}{5}$), C, 19, L. l. 38, L. tr. 6/6.

Length of head $5\frac{1}{2}$ to 6, of caudal $4\frac{1}{2}$ to $4\frac{2}{3}$, height of body $5\frac{1}{4}$ to $5\frac{1}{2}$ in the total length. *Eyes*—diameter $3\frac{1}{2}$ to $3\frac{3}{4}$ in the length of the head, 1 diameter from the end of snout, and $1\frac{1}{2}$ apart. Dorsal and abdominal profiles about equally convex. Width of the head equals its length behind the middle of the eyes. Snout very obtuse and not overhanging the jaws. The cleft of the month commences below the level of the lower edge of the eye. Lips continuous at the angle of the mouth, the lower one very thin and reflected off the mandible, which is rounded and has a thin cartilaginous covering: edges of lips smooth. No tubercles on the snout. *Barbels*—a minute maxillary pair. *Teeth*—pharyngeal, plough-shaped, 5, 4, 3/3, 4, 5. *Fins*—dorsal commences midway between the end of snout and the posterior extremity of the base of the anal fin, it is rather higher than the head is long, its upper edge is concave. Pectoral nearly as long as the head. Caudal deeply forked. *Lateral-line*—rather indistinct in some specimens: $4\frac{1}{2}$ rows of scales between it and the base of the ventral fin. *Colours*—silvery, dorsal and eaudal fins externally stained with gray: sometimes a dark blotch on the scales near the commencement of the lateral-line.

This fish, which is from the Deccan, agrees fairly with Sykes' description and figure. His specimen had no lateral-line.

Habitat.—Poona and the Deccan: the specimen figured (7 inches long) was from Poona.

Genus, 10—OSTEOCHILUS, *Günther.*

Rohita, sp. Cuv. and Val.

Abdomen rounded. Mouth of moderate width, directed more or less downwards: lips thickened, continuous, fringed or crenulated, the lower being reflected from off the mandible, leaving it uncovered in the form of a sharp and hard, transverse, prominence. No tubercle at symphysis. Snout obtusely rounded. Barbels, four or two. Pharyngeal teeth 5, 4, 2/2, 4, 5. *Dorsal fin without osseous ray, with a moderate number of branched ones* (10 *to about* 20). *commencing in advance of the ventrals. Anal with few rays. Scales of moderate or small size: no tiled row at base of anal fin. Lateral-line passing to the centre of the base of the caudal fin. Gill-rakers short.*

Geographical distribution.—Burma and the Malay Archipelago.

SYNOPSIS OF SPECIES.

1. *Osteochilus rostellatus*, D. $\frac{2}{18}$, A, $\frac{3}{5}$, L. l. 54. Four barbels. Colours uniform. Burma.
2. *Osteochilus Neilli*, D. $\frac{2-3}{15-16}$, A. 2/5, L. l. 34. Four barbels. A darkish band near commencement of lateral-line, and a dark mark before base of caudal fin. Burma.
3. *Osteochilus cephalus*, D. 3/13, A. 3/6, L. l. 40. Two barbels. Colours uniform. Pegu.

1. **Osteochilus chalybeatus**, Plate CXXIX, fig. 1.

Rohita rostellatus, Cuv. and Val. xvi, p. 256.
Rohita lineata, Cuv. and Val. xvi, p. 260.
Rohita chalybeata, Cuv. and Val. xvi, p. 271; Bleeker, Beng. p. 133 (not syn.)
Labeo chalybeatus, Günther, Catal. vii, p. 60.
Nga-leh, Burmese.

B. iii, D. 20($\frac{2}{18}$), P. 18, V. 9, A. 7($\frac{2}{5}$), C. 19, L. l. 54, L. tr. 8/10.

Length of head 5, of caudal 5, height of body $4\frac{1}{4}$ in the total length. *Eyes*—diameter 4 in the length of head, $1\frac{1}{4}$ diameters from the end of snout, and 2 apart. Dorsal profile more convex than that of the abdomen, and rather eoncave over the orbits: the interorbital space nearly flat. The greatest width of the head equals its length exeluding the snout. Snout overhanging the jaws and without any lateral lobe. Mouth rather narrow, its width being about 1/3 of length of head. Lips thick and fringed, with an inner fold above and below. Gill-rakers closely set and short. *Barbels*—the maxillary pair half as long as the orbit, the rostral ones shorter. *Fins*—the dorsal commences midway between the end of the snout and the posterior margin of the base of the anal fin, its upper edge is straight. Pectoral rather longer than the head excluding the snout, it does not reach the ventral, nor the latter the anal. Anal laid flat just reaches the caudal, which is moderately forked. *Scales*—six rows between the lateral-line and base of the ventral fin. *Colours*—gray, becoming lighter below, narrow dark lines along the body: fins black.

Habitat.—Irrawaddy and Salwein rivers in Burma. The specimen figured was from Moulmein.

2. **Osteochilus Neilli**, Plate CXXX, fig. 2.

Day, Proc. Zool. Soc. 1870, p. 99.

B. iii, D. 17-18 ($\frac{2-3}{15-16}$), P. 15, V. 9, A. 7($\frac{2}{5}$), C. 19, L. l. 34, L. tr. $5\frac{1}{2}/6\frac{1}{2}$.

Length of head $5\frac{1}{2}$, of caudal $4\frac{3}{4}$ to 5, height of body $3\frac{1}{2}$ in the total length. *Eyes*—diameter $3\frac{1}{2}$ in the

length of head, $1\frac{1}{2}$ diameters from the end of snout, and 2 apart. Dorsal profile more convex than that of the abdomen. The greatest width of the head equals its length excluding the snout. Interorbital space convex. Snout rounded and smooth, it scarcely overlaps the mouth which is of moderate width: no lateral lobe. Both lips fringed, with two, three, or more rows of well-developed papillæ internally: groove across the mandibles not complete; a cartilaginous covering internally to the lower jaw. *Barbels*—the rostral do not reach the orbit, the maxillary extend to beneath its centre. *Teeth*—pharyngeal, plough-shaped, 5, 4, 3/3, 4, 5. *Fins*—the dorsal commences before the ventral, and much nearer to the snout, than to the base of the caudal, its upper border is somewhat concave; caudal deeply forked. *Scales*—4 rows between the lateral-line and the base of the ventral fin. *Colours*—grayish-yellow, deepest superiorly, every scale being darkest at its base. A dull spot near the root of the caudal fin, and another ill-defined one near the commencement of the lateral-line. Fins, yellowish orange, dorsal darkest at its basal half.

Habitat.—Sittoung and Billing in Burma. The largest specimen, out of seven, measured six inches in length.

3. Osteochilus cephalus.

Labeo cephalus, Cuv. and Val. xvi, p. 374, pl. 487.

B. iii, D. $16(\frac{3}{13})$, P. 20, V. 9, A. 9 (3/6), C. 19, L. l. 40, L. tr. 7/7.

Length of head $4\frac{1}{2}$, of caudal $4\frac{1}{2}$, height of body 4 in the total length. *Eyes*—1/5 of length of head, two diameters from end of snout. The dorsal profile is much more convex than the abdominal. Interorbital space convex. The snout projects beyond the jaws, it is rather swollen and has many pores opening on its surface: the mandible has a transverse free edge, with thick lip, both the upper and lower being fringed. *Barbels*—one short maxillary pair. *Fins*—the dorsal commences midway between the snout and base of caudal, and in advance of the ventrals, its upper border is concave. The anal laid flat reaches the caudal. *Scales*—$4\frac{1}{2}$ rows between the lateral line and base of ventral fin. *Colours*—greenish, with the base of each scale darkest.

Habitat.—Pegu, attaining one foot in length.

Genus, 11—DANGILA, *Cuvier and Valenciennes.*

Cyrene, sp. Heckel.

Abdomen rounded. Snout moderately depressed and obtusely rounded. Mouth transverse, more or less inferior. Lower jaw sharp, covered with a thin lip, and having a tubercle above the symphysis: upper lip fringed. Barbels small, one maxillary and one mandibular pair. Pharyngeal teeth, 5, 4 or 3, 2 or 3/2 or 3, 3 or 4, 5. Dorsal fin rather long, without any osseous ray, and commencing in advance of the ventrals. Anal short, without a tiled row of scales. Scales of large, small, or moderate size. Lateral-line continuous, passing to the centre of the base of the caudal fin. Gill-rakers short.

This genus might perhaps be considered as belonging to *Cirrhina*, merely differing in possessing a few more rays in the dorsal fin. As however it does not appear to extend into India proper, it is more convenient for the purpose of adverting to geographical distribution, to leave it as distinct, at least for the present.

Geographical distribution.—From Burma to the Malay Archipelago.

SYNOPSIS OF SPECIES.

1. *Dangila Burmanica*, D. 26-28, L. l. 39-40, L. tr. 7/9. Burma.
2. *Dangila Berdmorei*, D. 26, L. l. 31, L. tr. 6/—. Tenasserim Provinces of British Burma.

1. Dangila Burmanica, Plate CXXXI, fig. 2.

Cirrhina Kuhlii, Day, J. A. S. of Beng. 1871, p. 133 (not Cuv. and Val.)

B. iii, D. $26\text{-}28(\frac{2-3}{24-25})$, P. 16, V. 9, A. $7(\frac{2}{5})$, C. 19, L. l. 39-40, L. tr. 7/9.

Length of head 7, of caudal $4\frac{1}{2}$ to 5, height of body $4\frac{1}{2}$ to 5 in the total length. *Eyes*—diameter 3 in the length of the head, 1 diameter from the end of snout, and $1\frac{1}{4}$ apart. Dorsal profile more convex than that of the abdomen. The greatest width of the head equals its length behind the middle of the eyes. Mouth transverse, with the snout slightly depressed and rounded: upper lip fringed: a small tubercle inside the lower jaw above the symphysis. *Barbels*—the maxillary pair as long as the eye, the rostral pair shorter. *Teeth*—pharyngeal, 5, 4, 3/3, 4, 5. *Fins*—dorsal commences above the ninth scale of the lateral-line, its upper edge concave, and its highest rays 4/5 of the height of the body. Pectoral nearly as long as the head and does not reach the ventral. Upper caudal lobe the longer. *Lateral-line*—5 rows of scales between it and the base of the ventral fin. *Colours*—silvery, some of the scales with dark spots at their bases forming rows, or horizontal bands. Fins orange, the edges of the caudal stained.

This fish is closely allied to *Dangila Kuhlii*, C. V., but appears to have a shorter head and less number of scales between the dorsal fin and lateral-line.

Habitat.—Moulmein and Tavoy (where it does not seem to be uncommon): several specimens obtained measured up to 10 inches in length. The example figured is 9·3 inches in length.

2. Dangila Berdmorei.

Dangila Berdmorei, Blyth, J. A. S. of Bengal, 1860, p. 162; Day, Proc. Zool. Soc. 1869, p. 554.

B. iii, D. 26($\frac{3}{2\ 3}$), V. 9, A. 7($\frac{2}{5}$), L. l. 31, L. tr. 6/?

Length of head 5, of caudal 4, height of body 4 in the total length. *Eyes*—diameter 2/5 of length of head, 3/4 of a diameter from end of snout. Pores on front of snout large. A distinct tubercle above symphysis. Lower lip rather thick, not fringed. *Barbels*—rostrals equal the length of the orbit. *Fins*—dorsal arises in the commencement of the second third of the total length. The pectoral does not quite reach the ventral. Caudal deeply forked. *Scales*—three and a half rows exist between the lateral-line and the base of the ventral fin. *Colours*—uniform in spirit.

Habitat.—Tenasserim Provinces of British Burma. Type in the Calcutta Museum.

Genus, 12—Cirrhina, *Cuvier and Valenciennes.*

Bangana, pt. Ham. Buch.: *Dangila*, sp. Cuv. and Val.: *Cyrene*, sp. Heckel.: *Mrigala*, sp. Bleeker: *Crossochilus*, pt. Günther.

Abdomen rounded. Snout depressed and obtusely rounded, with the soft coverings extremely thin. Mouth broad, transverse. Upper lip fringed or entire, and not continuous with the lower lip. Lower jaw rather sharp, without any or with a thin lip, generally destitute of any horny covering, but having a small tubercle above the mandibular symphysis. Barbels small, four, two, or none. Pharyngeal teeth 5, 4, 2 *or* 3/2 *or* 3, 4, 5 *or* 5, 3, 2/2, 3, 5. *Dorsal fin rather short, or of moderate length, without any osseous ray, and commencing in advance of the ventrals. Anal fin short, without a row of tiled scales. Scales of large, small, or moderate size. Lateral-line continuous, passing to the centre of the base of the caudal fin. Gill-rakers short.*

Geographical distribution.—Fresh waters of Belooehistan,* Sind, through Burma, and extending through the East Indian Archipelago.

SYNOPSIS OF SPECIES.

1. *Cirrhina cirrhosa*, D. 17-19, L. l. 42-44. Four barbels. Upper lip entire. Southern India.
2. *Cirrhina mrigala*, D. 15-16. L. l. 40-45. Two barbels. Upper lip entire. Cutch, Sind, Punjab, Bengal and Burma.
3. *Cirrhina latia*, D. 10-11. L. l. 38-40. Four barbels. Upper lip fringed. Sind, India generally.
4. *Cirrhina reba*, D. 10-11. L. l. 35-38. One pair of short rostral barbels. Upper lip indistinctly fringed or entire. Throughout India.
5. *Cirrhina fulungee*, D. 10, L. l. 48. Two barbels. Poona and the Deccan.

1. Cirrhina cirrhosa, Plate CXXXI, fig. 3.

Cyprinus cirrhosus, Bloch, xii, p. 52, t. 411; Bloch, Schn. p. 450.
Dangila Leschenaultii, Cuv. and Val. xvi, p. 235, pl. 471.
Cirrhina Blochii, Cuv. and Val. xvi, p. 290.
Cirrhinus Cuvierii, Jerdon, M. J. L. and Sc. 1849, p. 304.
Cirrhina Leschenaultii, Günther, Catal. vii, p. 36.
Ven-candi, Tam.; *Aruzu*, Tel.

B. iii, D. 17-19 ($\frac{3-4}{14-15}$), P. 19, V. 9, A. 8 ($\frac{3}{5}$), C. 19, L. l. 42-44, L. tr. 8/9, Vert. 21/17.

Length of head $5\frac{1}{2}$ to 6, of caudal 5, height of body $4\frac{1}{2}$ to 5 in the total length. *Eyes*—diameter $3\frac{1}{4}$ in the length of the head, 1 diameter from end of snout, and $1\frac{1}{2}$ apart. Dorsal profile more convex than that of the abdomen. The greatest width of the head equals its length excluding the snout. Width of mouth equals 1/3 of the length of the head. Usually some fine pores on the snout, which does not project beyond the jaws. *Barbels*—the maxillary are about 1/3 as long as the eye, the rostral pair are rather longer. *Teeth*—pharyngeal teeth plough-shaped and with the sides of the outer ones roughened, 5, 4, 3/3, 4, 5. *Fins*—the dorsal as high as the body, it arises considerably in advance of the ventrals, and midway between the snout and the posterior portion of the base of the anal fin, its upper margin concave: in some large specimens the first few rays are very elongated. Caudal deeply forked or lunated. *Scales*—$5\frac{1}{2}$ to $6\frac{1}{2}$ rows between lateral-line and the base of the ventral fin. *Colours*—silvery, every scale having a red centre, except along the abdomen where they are of a dull yellowish-white. Dorsal and caudal stained with gray, also the outer end of the anal and pectoral.

Habitat.—Godavery, Kistna and Cauvery rivers, and generally in southern India. Grows to $1\frac{1}{2}$ feet in length. Is a very active fish and fair eating, but bony.

2. Cirrhina mrigala, Plate CXXIX, fig. 4.

Cyprinus mrigala, Ham. Buch. Gang. Fish. pp. 279, 386, pl. 6, f. 79; McClelland, Ind. Cyp. pp. 276, 350.
Cirrhina rubripinnis and *plumbea*, Cuv. and Val. xvi, pp. 288, 289, pl. 479.

* I have examples of a species of this genus from Gwadur, which I purpose naming after its donor, Colonel Miles, *Cirrhina Milesi.* It was found in the Hubb river.

Cirrhina mrigala, Cuv. and Val. xvi, p. 294; Günther, Catal. vii, p. 35; Day, J. A. S. of B. 1871, p. 135, pl. ix, f. 6, *a*, *b*.

Mrigala Buchanani, Bleeker, Prod. Cyp. p. 226.

Mirrgah, Ooriah; *Mrigala*, Beng. and Hind.; *Naim*, Hind. (N. W. P.); *Nga-kyin* and *Nga-gyein*, Burm.; *Mor-ah-kee*, Sind. and Cutch.

B. iii, D. 15-16 ($\frac{3}{12-13}$), P. 15, V. 9, A. 8 ($\frac{3}{5}$), C. 15, L. l. 40-45, L. tr. $6\frac{1}{2}$-$7/8\frac{1}{2}$.

Length of head 5 to $5\frac{1}{4}$, of caudal 5, height of body 4 to $5\frac{1}{2}$ in the total length. *Eyes*—in the anterior 1/2 of the head, diameter $3\frac{1}{2}$ to 4 in the length of the head, 1 to $1\frac{1}{4}$ diameters from the end of snout, and 2 apart. The greatest width of the head eqnals its length behind the middle of the eyes. Width of the mouth equals 2/5 of the length of the head. Pores present or absent on the snout. *Teeth*—pharyngeal teeth plough-shaped, 5, 4, 2/2, 4, 5. *Fins*—dorsal nearly as high as the body, it arises rather nearer to the snout than to the base of the caudal fin, and opposite the 12th scale of the lateral-line, upper margin of fin slightly concave, in Sind deeply so. Pectoral as long as the head excluding the snout, and does not reach the ventral. Caudal with sharp and deeply forked lobes, which have convex edges internally. *Scales*—$5\frac{1}{2}$ to 6 rows between the latter and the base of the ventral ($4\frac{1}{2}$ in *C. plumbea*). *Colours*—silvery, dark gray along the back, sometimes having a coppery tinge: the pectoral, ventral and anal, orange stained with black. Eyes golden.

Cirrhina fulungee, Sykes, is very closely allied to *C. mrigala*, but its barbels are shorter.

Habitat.—Rivers and tanks in Bengal, Deccan, N. W. Provinces, Punjab, Sind, Cutch, and Burma, growing to 3 feet in length. It is an excellent species for stocking tanks with. I have taken it in Rangoon 18 pounds in weight.

3. **Cirrhina latia**, Plate CXXX, fig. 4.

Cyprinus latius, and *gohama*, Ham. Buch. Fish. Ganges, pp. 345, 346, 393; Cuv. and Val. xvi, pp. 411, 413.

? Cyprinus sada, Ham. Buch. l. c. pp. 344, 393; Cuv. and Val. xvi, p. 385.

Barbus diplochilus, Heckel, Fische aus Kashmir, p. 53, t. 10, f. 1; Cuv. and Val. xvi, p. 204.

Tylognathus barbatulus, Heckel, in Hügels Reise, iv, p. 376, and in Russ. Reisen, II, iii, p. 283, (no description).

Gonorhynchus fimbriatus, *macrosomus* and *brevis*, McClell. Ind. Cyp. pp. 282, 372, 373, 375, pl. 43, f. 3, 6, and 7, (from H. B.'s MSS.)

Chondrostoma wattanah, Sykes, Trans. Z. Soc. ii, p. 360, t. 62, f. 4; Bleeker, Beng. p. 25.

Crossocheilus latius and *gohama*, Bleeker, Pro. Cyp. p. 110; Günther, Catal. vii, p. 71.

Crossocheilus diplochilus, Steind. Verh. zool.-bot. Ges. Wien, 1866, p. 791.

Crossocheilus barbatulus, Günther, Catal. vii, p. 72; Beavan,* P. Z. S. 1872, p. 152, f. 2.

Crossocheilus rostratus, Günther, l. c. p. 72, and Zool. Record, 1870, p. 135.

Crossocheilus sada, Günther, l. c. p. 74.

Kala-batta, Bengali; *Behrah* and *Tellarree*, Punj.; *Curru*, Sind.

B. iii, D. 10-11 ($\frac{3}{7-8}$), P. 15, V. 9, A. 7 ($\frac{2}{5}$), C. 19, L. l. 38-40, L. tr. 6/6, Vert. 15/17.

Length of head 6 to $6\frac{1}{2}$, of caudal $4\frac{1}{2}$ to 5, height of body $5\frac{1}{2}$ to 7 in the total length. *Eyes*—rather behind the middle of the head in the adult: in the middle in the young: diameter $3\frac{1}{2}$ to 5 in the length of the head, about 2 diameters from end of snout, and also apart. Dorsal profile more convex than the abdominal. Upper surface of the head rather broad: snout overhanging the jaws and having a small lateral lobe. Upper lip deeply indented on the edge, and each indentation (in some specimens) having a tricuspid termination, this is most seen in examples from Calcutta and Orissa, least so in those from Sind, the Punjab, and central Provinces: the surface rough as in *Discognathus*. Lower lip with a strong sharp horny covering, the lip at the angle having a sort of pendulous lobe: the under surface of the jaw with a ronnd, callous, and rather elevated spot, which in the adult has a free anterior edge. *Barbels*—a rostral pair and sometimes a short maxillary pair. *Teeth*—pharyngeal, crooked, 5, 4, 2/2, 4, 5. *Fins*—dorsal commences about midway between the end of the snout and base of the caudal fin in the young, but rather nearer the snout in the adult. Pectoral as long as the head, its outer three or four rays rather thickened. Caudal deeply forked, upper lobe sometimes the longer. *Lateral-line*—$3\frac{1}{2}$ to $4\frac{1}{2}$ rows between it and the base of the ventral fin. *Colours*—brownish-olive, irregularly spotted with black marks. Dorsal and caudal fins yellowish, stained with gray, the others orange.

This fish has much the character of a loach or of a *Discognathus*, adhering to stones in the beds of rivers. Hamilton Buchanan observes that *C. gohama* differs very little from *C. latia*, but it dies very soon out of water, and its form is somewhat deeper and more protuberant on the back.

Habitat.—Sind, Orissa, Bengal, N. W. Provinces, Punjab, Deccan, and along the Himalayas. It attains 8 inches in length.

* In the British Museum these specimens are marked *Crossochilus Rawulensis*, Beavan.

4. Cirrhina reba, Plate CXXX, fig. 3.

Cyprinus reba, Ham. Buch. Fish. Ganges, pp. 280, 386; McClelland, Ind. Cyp. pp. 276, 354.
Gobio isurus and *limnophilus*, McClell. Ind. Cyp. pp. 279, 358, pl. 55, f. 3; Cuv. and Val. xvi, pp. 431, 464.
Chondrostoma Gangeticum, Cuv. and Val. xvii, p. 399; Günther, Catal. vii, p. 76.
Cirrhina Dussumieri and *reba*, Cuv. and Val. xvi, pp. 291, 292, pl. 480.
Cirrhina Bengalensis, Bleeker, Verh. Bat. Gen. xxv, Beng. en Hind. p. 136.
Mrigala Bengalensis, Bleeker, Pro. Cyp. p. 226.
Cirrhinichthys Dussumieri, Bleeker, Atl. Ich. Cyp. p. 28.
Gobio bangon, limnophilus and *Dussumieri*, Jerdon, M. J. L. and S. 1849, p. 308.
Cirrhina rewah, Steind. Sitz. Ak. Wiss. Wien, lvi. p.
Crossochilus reba, Günther, Catal. vii, pp. 72, 74.
Eelemose and *Chittahri*, Tel.; *Chetchua-porah*, Ooriah; *Batta*, Bengali; *Rewah*, Hind.; *Soonnee*, Punj. and Sind.; *Lasseem*, Assam.

B. iii, D. 10-11 ($\frac{2-3}{8-9}$), P. 16, V. 9, A. 8 ($\frac{3}{5}$), C. 19, L. l. 35-38, L. tr. 7/9.

Length of head 6 to $6\frac{1}{4}$, of caudal $4\frac{3}{4}$ to $5\frac{1}{4}$, height of body 4 to $4\frac{1}{2}$ in the total length. *Eyes*—diameter 4 in the length of head, 1 to $1\frac{1}{2}$ diameters from the end of snout, and nearly 2 apart. Dorsal profile slightly more convex than that of the abdomen. The greatest width of the head equals its length excluding the snout. Snout slightly projecting, more distinctly in the immature. Upper lip fringed in the young, sometimes entire in the adult. A thin cartilaginous layer covering inside of lower jaw. Pores on snout present or absent. *Barbels*—a short rostral pair, which may be absent: none on the maxilla. *Teeth*—pharyngeal, 5, 4, 1/1, 4, 5. *Fins*—dorsal commences slightly nearer the snout than the base of the caudal fin, and anterior to the ventral, upper margin of the fin concave. Pectoral nearly as long as head. Caudal with deep, sharp, lobes. *Lateral-line*—five to six rows of scales between it and the base of the ventral fin. *Scales*—hexagonal. *Colours*—silvery, scales generally darkest at their edges, forming bluish longitudinal bands above the lateral-line. The young have sometimes a leaden-coloured band along the side.

Gobio angra, McClelland, Ind. Cyp. pp. 227, 354, I believe to be this species for reasons given at p. 541.

Gobio angraoides, Jerdon, from the Malabar coast of India, is perhaps only a variety of this species; it has however 44 rows of scales along the lateral-line, whilst the upper lip is scarcely fringed. Having obtained several specimens in South Canara I have come to the conclusion that it can only be considered a variety.

That *Cyprinus bangon* (H. B.) McClelland, is *C. reba*, is I think unquestionable. H. B. observes in his MSS. list, Gorakpur district, "the Bhangan of Rangpur is here called *Bukti*." In the Rangpur list the description is nearly the same as part of *C. reba*, in the Fishes of the Ganges. In his Bhagalpur list he observes the *Banghi Rewa* is the Bhangan of Rangpur.

Habitat.—Throughout India, attaining a foot in length.

5. Cirrhina fulungee, Plate CXXXII, fig. 1.

Chondrostoma fulungee, Sykes, Trans. Zool. Soc. ii, p. 358; Bleeker, Beng. p. 25.
Gymnostomus fulungee, Günther, Catal. vii, p. 76.

B. iii, D. 10 ($\frac{2}{8}$), P. 15, V. 9, A. 7 ($\frac{2}{5}$), C. 19, L. l. 48, L. tr. 8/9.

Length of head $5\frac{3}{4}$, of caudal $4\frac{3}{4}$, height of body $5\frac{1}{4}$ in the total length. *Eyes*—diameter 1/3 of the length of head, 2/3 of a diameter from the end of snout, and 1 apart. Dorsal and abdominal profiles about equally and slightly convex: the greatest width of the head equals its length excluding the snout. Snout slightly overhanging the mouth. The upper lip scarcely fimbriated, the two not continuous: the lower is reflected from off the mandible, which is transverse, sharp, having a tubercle above the symphysis, but no cartilaginous covering. *Barbels*—a very short rostral pair: none on the maxilla. *Fins*—the dorsal nearly as high as the body, its upper edge concave, it commences midway between the end of the snout and the posterior end of the base of the anal fin. Pectoral almost as long as the head, ventral of equal length. Caudal deeply forked. *Lateral-line*—$6\frac{1}{2}$ rows of scales between it and the base of the ventral fin. *Colours*—brownish along the back, divided by a light bluish band from a silvery abdomen: dorsal and caudal stained with gray.

Habitat.—Poona and the Deccan.

Genus, 13—Semiplotus, *Bleeker*.

Abdomen rounded. Snout thick and prominent. Mouth wide, transverse, inferior, with a knob at the symphysis. No barbels. Pharyngeal teeth plough-shaped, 4, 3, 2/2, 3, 4. *Dorsal fin long, its last undivided ray, strong, osseous, and either serrated or entire. Anal rather short. Scales large: no tiled row at the base of the anal fin. Lateral-line passing to the centre of the base of the caudal fin. Gill-rakers short.*

Geographical distribution.—Assam and Chittagong Hill ranges, as well as Burma.

SYNOPSIS OF SPECIES.

A.—*Dorsal ray serrated.*

1. *Semiplotus modestus*, D. 24, A. 9-10, L. l. 32-34. Last undivided dorsal ray osseous and serrated. Akyab.

B.—*Smooth dorsal ray.*

2. *Semiplotus McClellandi*, D. 3/25, A. 9, L. l. 27. Last undivided dorsal ray osseous and entire. Colour, silvery. Assam and Burma.

A.—*Serrated dorsal ray.*

1. Semiplotus modestus, Plate CXXXIII, fig. 1.

Day, Proc. Zool. Soc. 1870, p. 101.

B. iii, D. 24($\frac{4}{20}$), P. 15, V. 9, A. 9-10($\frac{3}{6-7}$), C. 19, L. l. 32-34, L. tr. $7\frac{1}{2}/7\frac{1}{2}$.

Length of head $5\frac{1}{4}$ to $5\frac{1}{2}$, of caudal $4\frac{1}{4}$, height of body nearly 3 in the total length. *Eyes*—diameter 3 to $3\frac{1}{2}$ in the length of head, 1 diameter from end of snout, $1\frac{1}{2}$ diameters apart. Snout broad, obtuse, overhanging the mouth: several open pores on either side. Mouth inferior, transverse, a thin cartilaginous covering to the lower jaw. A small knob at the symphysis. The posterior extremity of the maxilla extends to beneath the middle of the orbit. *Barbels*—absent. *Teeth*—pharyngeal, 4, 3, 2/2, 3, 4. *Fins*—dorsal fin commences anterior to the origin of the ventral, and extends to above the anal, its last undivided ray is osseous, serrated, and as long as the head excluding the snout. The pectoral reaches the ventral and the latter the anal. Caudal forked. *Lateral-line*—$3\frac{1}{2}$ rows of scales between it and the base of the ventral fin. *Colours*—silvery, darkest in the upper half of the body. Ventrals and anal tipped with orange.

Habitat.—Hill ranges near Akyab: two specimens obtained, up to $5\frac{1}{2}$ inches in length.

B.—*Smooth dorsal ray.*

2. Semiplotus McClellandi, Plate CXXXIII, fig. 4.

Cyprinus semiplotus, McClell. Ind. Cyp. pp. 274, 346, pl. xxxvii, fig. 2; Cuv. and Val. xvi, p. 68.
Semiplotus McClellandi, Bleeker, Atl. Ich. Cyp. p. 25; Günther, Catal. vii, p. 204.
Sunduree, *Sentoree*, and *Lah-bo-e*, Assam.

B. iii, D. 27-28($\frac{3}{24-25}$), P. 16, V. 10, A. 9($\frac{2}{7}$), C. 19, L. l. 27-33, L. tr. 6/6.

Length of head $5\frac{1}{2}$ to 6, of caudal 4 to $4\frac{1}{2}$, height of body $3\frac{1}{2}$ in the total length. *Eyes*—in the middle of the length of the head, diameter from 4 to 6 in the length of head, the width of the interorbital space equalling rather above half the length of the head. Dorsal profile more convex than that of the abdomen: the height of the head equals its length. Snout obtuse, and thickened: with a row of about 6 open pores, passing across it and towards the orbit. A horny covering to lower jaw. *Barbels*—absent. *Teeth*—pharyngeal, plough-shaped, 4, 3, 2/2, 3, 4. *Fins*—dorsal commences midway between the end of the snout and the end of the base of the anal fin, its height slightly exceeding half of that of the body, its last undivided ray strong, osseous, entire, and rather longer than the head excluding the snout. Pectoral nearly as long as the head, it reaches to above the ventral, which is inserted below the fourth or fifth dorsal ray. Anal laid flat nearly reaches the base of the caudal which latter is deeply forked. *Lateral-line*—nearly straight, $3\frac{1}{2}$ rows of scales between it and the base of the ventral fin. *Colours*—of a leaden silver, darkest superiorly: the pectoral, ventral, and anal orange.

Griffith observes that the smaller examples are usually found near rapids, the larger ones in deeper water where of an evening they are seen rising, but refuse all baits. McClelland states that this fish is reckoned the most delicious in Assam. I can however record from personal observation that it is rich and very liable to set up intestinal irritation.

Habitat.—Rivers in Assam, especially in the upper portions of that district, but found as low as Goalpara: also Burma. It is often termed *Rajah-mas*, or "kings' fish" in upper Assam, as it is asserted that when captured it had to be taken to the Rajahs for their own consumption. As it is very common this explanation is improbable. More likely a tax was levied on its capture. It attains at least two feet in length.

Genus, 14—Scaphiodon, *Heckel.*

Capoëta, sp. and *Chondrostoma*, sp. Cuv. and Val.: *Dillonia*, *Gymnostomus*, sp. Heckel.

Abdomen rounded. Snout rounded. Mouth transverse, inferior, with the mandibular edge nearly straight and sharp: without any knob above the symphysis. The mandibles angularly bent inwards. A horny layer inside the lower jaw, which is not covered by lip. No lower labial fold. Barbels four, two, or absent. Pharyngeal teeth, plough-shaped, 5 or 4, 3, 2/2, 3, 4 or 5. Dorsal fin of moderate extent, its last undivided ray being osseous and serrated or entire, or else articulated. Anal rather short. Scales large, of moderate or small size, and sometimes irregularly disposed. Lateral-line passing to the centre of the base of the caudal fin.*

This genus is closely allied to *Semiplotus*, but its dorsal fin is of less extent.

* None of the following species agree with Dr. Günther's definition of the genus (*Capoëta*) *Scaphiodon*:—Dorsal fin "with not more than nine branched rays," all exceeding that number.

Geographical distribution.—Rivers of Western Asia extending to those in Sind and along the Western Ghauts, as low as the Neilgherry hills and rivers at their base.

SYNOPSIS OF SPECIES.

A.—*A pair of maxillary barbels.*

1. *Scaphiodon Watsoni*, D. 13, L. l. 33, L. tr. 6/6. A pair of maxillary barbels. Last undivided dorsal ray, osseous, serrated. Sind hills and Punjab salt range.
2. *Scaphiodon irregularis*, D. 13, L. l. 36, L. tr. 9/9. A pair of maxillary barbels. Last undivided dorsal ray osseous, serrated. Sind hills.

B.—*Barbels absent.*

3. *Scaphiodon Thomassi*, D. 14-15, L. l. 39. Barbels absent. Last undivided dorsal ray articulated. Silvery. South Canara.
4. *Scaphiodon Nashii*, D. 14-15, L. l. 40-43. Barbels absent. Last undivided dorsal ray articulated. A black band along the side; fins with black marks. Coorg, hill streams of Wynaad and South Canara.
5. *Scaphiodon brevidorsalis*, D. 14, L. l. 40. Barbels absent. Last undivided dorsal ray osseous, entire. Silvery. Rivers at base of Neilgherry hills.

A.—*A pair of maxillary barbels.*

1. Scaphiodon Watsoni, Plate CXXXV, fig. 2.

Day, Journal Asiatic Society of Bengal, 1872, Vol. xli, pt. ii, p. 324.

B. iii, D. 13($\frac{3}{10}$), P. 15, V. 8, A. 9($\frac{2}{7}$), C. 19, L. l. 33, L. tr. 6/6.

Length of head 1/5, of caudal 1/5, height of body 2/9 of the total length. *Eyes*—situated in the last part of the anterior half of the head, diameter 2/9 of length of head, $1\frac{1}{2}$ diameters from end of snout. Interorbital space rather convex. Snout rounded, rather overhanging the mouth, and covered with glands: mouth transverse, inferior: mandibles sharp, not enveloped by lip, and having a horny layer inside. *Barbels*—a maxillary pair as long as the eye. *Teeth*—pharyngeal, plough-shaped, 4, 3, 2/2, 3, 4. *Fins*—dorsal commences rather in front of the ventrals, and midway between the end of snout and base of caudal, its last undivided ray strong, osseous, serrated, as long as the head without the snout, and nearly as long as the branched rays which are two-thirds as high as the body. Pectoral as long as the head excluding the snout, but not reaching the ventrals. Caudal forked. *Lateral-line*—very slightly curved, $3\frac{1}{2}$ rows of scales between it and ventral fin. *Colours*—silvery, dashed with gold, lightest on the abdomen. Various and very irregular black spots on the body.

Habitat.—Rivers on Sind hills and salt range of the Punjab.

2. Scaphiodon irregularis, Plate CXXXV, fig. 3.

Day, Journal Asiatic Society of Bengal, 1871, Vol. xli, pt. ii, p. 324.

B. iii, D. 13($\frac{3}{10}$), P. 17, V. 8, A. 2/7, C. 19, L. l. 36, L. tr. 9/9.

Length of head 1/5, of caudal 1/5, height of body 1/5 of the total length. *Eyes*—situated rather before the middle of the length of head, $1\frac{1}{3}$ diameters from end of snout, and also apart. Interorbital space nearly flat. Snout somewhat rounded, covered with glands and having a depression across it from eye to eye. Mouth transverse, upper jaw slightly the longer. *Barbels*—a maxillary pair nearly as long as the eye. *Fins*—dorsal commences rather before the ventrals, midway between the end of the snout and the base of the caudal, its third undivided ray is osseous, weak, and serrated, nearly half as long as the head, whilst the fin is three-fourths as high as the body. Pectoral nearly as long as the head. Caudal forked, its lower lobe the longer. *Scales*—two or three rows above the lateral-line are of a large oblong form, above which are numerous little irregular ones continued forwards to the head: $4\frac{1}{2}$ rows between the lateral-line and the base of the ventral fin. *Colours*—olive, shot with gold.

This species is closely allied to the last, from which it more especially differs in the scaling.

Habitat.—Sind hills to 3500 feet elevation.

3. Scaphiodon Thomassi, Plate CXXXIV, fig. 1.

B. iii, D. 14-15 ($\frac{3}{11-12}$), P. 16, V. 9, A. 8 ($\frac{2}{6}$), C. 19, L. l. 39, L. tr. 7/7.

Length of head $5\frac{1}{4}$ to 6, of caudal $4\frac{1}{4}$ to $4\frac{3}{4}$, height of body $3\frac{1}{2}$ in the total length. *Eyes*—diameter $4\frac{1}{3}$ in the length of the head, 2 to $2\frac{1}{4}$ diameters from the end of snout, and 2 apart. Height of head almost equals its length, its width is much less. Snout obtuse, overhanging the mouth, which is transverse: its width equalling that of the head behind the middle of the eyes. Mandible anteriorly with a horny covering. Lips not continuous, the upper one fringed. Large pores on the snout and upper lip, and a line of them continued to under the eye. *Barbels*—absent. *Fins*—dorsal arises slightly nearer the snout than the base of the caudal, it is 3/4 as high as the body, its last undivided ray weak, articulated. Pectoral as long as the head. Ventral arises under the fourth or fifth dorsal ray, it does not quite reach the anal, the latter when laid flat extends to the caudal, which is deeply forked. *Scales*—$4\frac{1}{2}$ rows between the lateral-line and the base of the ventral fin.

Colours—of a dull silvery colour along the back, with an indistinct silvery band along the side, and of a dull white beneath. A dark band along the dorsal fins, and caudal with a dark outer edge.

Habitat.—South Canara, from whence H. S. Thomas, Esq., of the Madras Civil Service, after whom I have named the species, sent me two examples.

4. **Scaphiodon Nashii,** Plate CXXXIII, fig. 3.

Barbus Nashii, Day, Proc. Zool. Soc. 1868, p. 584.

B. iii, D. 14-15 ($\frac{2-3}{11-12}$), P. 15, V. 9, A. 7 ($\frac{2}{5}$), C. 20, L. l. 40-43, L. tr. 7/7.

Length of head $5\frac{1}{4}$ to 6, of caudal $4\frac{1}{2}$ to $4\frac{3}{4}$, height of body 4 to 5 in the total length. *Eyes*—diameter 3 to 4 in the length of the head, 1 to $1\frac{1}{2}$ diameters from the end of snout, and $1\frac{1}{2}$ to $1\frac{3}{4}$ apart. The greatest width of the head equals its length excluding the snout. Mouth broad, inferior, transverse, and overhung by the snout.* Lips thin, without any transverse fold across the lower one. Snout in the adult covered by papillæ. A thick horny covering inside the lower jaw in adults. *Barbels*—absent. *Teeth*—pharyngeal, crooked, sharp, 5, 4, 3/3, 4, 5. *Fins*—dorsal commences nearer the snout than the base of the caudal, it is 3/4 as high as the body, its upper edge concave, no osseous ray. Pectoral about as long as the head. Ventral arises below the middle of the dorsal fin, and does not quite reach the anal, nor the latter the caudal which is deeply forked. Free portion of the tail as long as high. *Scales*—$4\frac{1}{2}$ rows between the lateral-line and base of ventral fin. *Colours*—reddish-brown along the back, abdomen silvery. A black band passes from the eye to the centre of the caudal fin. A dark band along the middle third of the dorsal, which is edged superiorly by scarlet, a dark band on anal having a light anterior edge: a dark edging to the caudal. The *young* are silvery-gray along the back, becoming silvery on the sides: the lateral band terminates in a black blotch at the base of the caudal fin.

Habitat.—Coorg, hill-streams of South Canara and the Wynaad. I received a small specimen (4 inches long) in rather a mutilated condition from Fraserpett, collected by Dr. Nash in 1868; lately I have received two fine specimens from Mr. Thomas, collected in South Canara.

5. **Scaphiodon brevidorsalis,** Plate CXXXIII, fig. 2.

Semiplotus brevidorsalis, Day, Proc. Zool. Soc. 1873, p. 239.
Mean-candee, Tamil.

B. iii, D. 14 ($\frac{3}{11}$), V. 9, A. 7, L. l. 39-40, L. tr. 7-8/9.

Length of head 6, of caudal $4\frac{1}{2}$, height of body $3\frac{1}{2}$ in the total length. *Eyes*—diameter 3 to 4 in the length of head, and situated in or rather before the middle of its length, and $2\frac{1}{2}$ apart. Dorsal profile much more convex than that of the abdomen. Snout swollen, overhanging the jaws; mouth inferior, transverse: three rows of large pores across the snout, and extending on to the preorbital bone; knob at symphysis badly developed; a thin cartilaginous covering to both jaws. Upper lip crenulated. *Barbels*—absent. *Fins*—last undivided dorsal ray osseous, very strong, entire, longer than the head by a distance equal to one diameter of the orbit; dorsal fin commences midway between the snout and the base of the caudal, the fin two-thirds as high as the body below it. Pectoral falciform, extending to over the ventral, which last is long, reaching to the anal: caudal deeply forked. *Scales*—$4\frac{1}{2}$ rows between the lateral-line and the base of the ventral fin. *Colours*—silvery, darkest along the back, fins stained with gray.

Habitat.—Rivers below the Neilgherry hills in the Madras Presidency.

Genus, 15—Carassius, *Nilsson.*

Abdomen rounded. Snout obtuse and rounded. Mouth anterior, arched, and rather narrow: lips thin. No barbels. Pharyngeal teeth compressed and in a single series, 4/4. Dorsal fin long, commencing opposite the ventrals, and having its last undivided ray osseous and serrated: last undivided anal ray osseous and normally serrated. Scales of moderate size. Lateral-line complete to the centre of the base of the caudal fin.

Geographical distribution.—Temperate portions of Europe and Asia; having been domesticated it has degenerated into numerous varieties.

SYNOPSIS OF SPECIES.

1. *Carassius auratus*, D. $\frac{3}{16-18}$, A. 3/5. From rifle green to silver or orange colours. Bombay? China, &c.

1. **Carassius auratus.**

Cyprinus auratus, Linn. Sys. Nat. vol. i, p. 527; Bl. Schn. p. 439; Lacép. vol. v, p. 553; Cuv. and Val. vol. xvi, p. 101; Richard, Ich. China, p. 293.

Carassius auratus, Bleeker, Atl. Ich. Cyp. p. 74; Günther, Catal. vol. vii, p. 32 (exclude *Cyprinus Nukta*.)

* The mouth in this species alters so with age, that until I had compared specimens of my *Osteochilus Malabaricus* with gradations of *Scaphiodon Nashii* since obtained, I could have not believed in their being identical. In the young the jaws are compressed, each with a cartilaginous covering: the lips at the angle are thick and continuous, not continued across the chin. As age increases the mouth widens, the cartilaginous covering becomes more horny, and the colours of the fish alter.

B. iii, D. 19-21($\frac{3}{16\text{-}18}$), P. 17, V. 9, A. 8($\frac{3}{5}$), C. 19, L. l. 27-29, L. tr. $6\frac{1}{2}$/10, Vert. 18/13.

The gold carp is too well known to require any detailed description.

The almost endless deformities into which, due to domestication, this species has degenerated, may be briefly defined as follows. Vertebral column only deformed: fins also abnormal, the dorsal being decreased or even absent: the anal spine double: caudal enlarged and with three or four lobes. Occasionally the eyes are protruding. As I doubt whether this fish has ever been found wild in India, I have not considered it necessary to give a figure or its numerous synonyms.

Habitat.—Mr. Masters, according to Dr. Günther, sent three adult specimens from Bombay to the British Museum, still I suspect they were not captured wild in India, the nearest point where they are obtained in a state of nature, being high up in Upper Burma, or rather within the borders of China, from whence Dr. J. Anderson brought examples.

Genus, 16—Catla, *Cuvier and Valenciennes.*

Gibelion, Heckel; *Hypselobarbus*, Bleeker.

Head broad: snout with very thin integuments, upper lip absent, the lower moderately thick, having a continuous and free posterior margin. The lower jaw with a moveable articulation at the symphysis, but destitute of any prominent tubercle. No barbels. Gill rakers long, fine, and closely set. Eyes with free orbital margins. Pharyngeal teeth plough-shaped, 5, 3, 2 | 2, 3, 5. *Dorsal fin rather long, without osseous ray, it commences somewhat in advance of the ventrals: anal short: caudal forked. Scales of moderate size, no tiled row along the base of the anal fin. Lateral-line continuous to the centre of the base of the caudal fin.*

Geographical distribution.—This fish appears to be absent from Southern India, below the Kistna at Masulipatam: it is found in Sind, the Punjab, also in the N. W. Provinces, the Deccan, and throughout Bengal, Assam, and Burma as far as the Pegu river. It is said not to exist in Tenasserim, but is present in Siam.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Catla Buchanani*, D. 17-19, A. 8, L. l. 40-43, L. tr. $7\frac{1}{2}$/9.

1. **Catla Buchanani,** Plate CXXXIV, fig. 5.

Cyprinus catla, Ham. Buch. Fishes of Ganges, pp. 287, 318, 387, pl. 13, f. 81; McClelland, Ind. Cyp. pp. 275, 348; Cuv. and Val. xvi, p. 433.

Leuciscus catla, Val. in Bel. Voy. Ind. Orient. p. 379, pl. 3, f. 2.

Catla Buchanani, Cuv. and Val. xvii, p. 411, pl. 515; Bleeker, Verh. Bat. Gen. xxv, Beng. en Hind. p. 142; Günther, Catal. vii, p. 34; Day, Proc. Zool. Soc. 1869, p. 370.

Cyprinus abramioides, Sykes, Trans. Zool. Soc. ii. p. 353, pl. 61, f. 2.

Hypselobarbus (Tambra) abramioides, Bleeker, Pro. Cyp. p. 275.

Botchee, Telugu: *Catla*, Bengal, Hind. and Punj.: *Barkur*, Ooriah: *Nga-thaing*, Burmese: *Tambra*, Hind. in Bombay: *Boassa*, Hind. in N. W. Provinces: *Tay-lee*, Sind.

B. iii, D. 17-19 ($\frac{3\text{-}4}{14\text{-}16}$), P. 21, V. 9, A. 8 ($\frac{3}{5}$), C. 19, L. l. 40-43, L. tr. $7\frac{1}{2}$/9, Vert. 17/18.

Length of head $4\frac{1}{4}$ to $4\frac{3}{4}$, of caudal $4\frac{1}{4}$ to $4\frac{1}{2}$, height of body 3 to $3\frac{1}{2}$ in the total length. *Eyes*—in the anterior half of the length of the head, diameter 6 to 7 in the length of the head, 2 diameters from the end of the snout, and 3 apart. Dorsal profile much more convex than that of the abdomen. The greatest width of the head equals its length behind the middle of the eyes. Mouth wide, lower jaw prominent: in large specimens some pores on the snout. *Teeth*—pharyngeal, plough-shaped, 5, 3, 2 | 2, 3, 5. *Fins*—dorsal commences in advance of the ventrals, is 2/3 as high as the body, and with a concave upper edge. Pectoral extends to the ventral, and the latter, in males, to the anal. Anal laid flat, reaches to beyond the commencement of the caudal. The fins in some specimens are much elongated. *Lateral-line*—from $5\frac{1}{2}$ to $6\frac{1}{2}$ rows of scales between it and the base of the ventral fin. *Colours*—grayish above, becoming silvery on the sides and beneath. Fins dark coloured, in some specimens nearly black.

This fish is largely employed for stocking tanks. In May, 1875, Mr. Mitchell had a tank 65 × 58 feet and 13 feet deep, dug upon his ground at Garden Reach, near Calcutta; into it were put some fry of this species, from 1/2 to 1 inch or less in length. September 22nd it was netted, and several dozens captured, one of the largest weighing 14 oz. and measuring 11 inches in length: the others were 1 or 2 oz. lighter. (*Nature*, Dec. 9th, 1875, p. 107).

Habitat.—Sind, Punjab, through India to the Kistna, and eastwards through Bengal, and Burma to Siam. It attains at least 6 feet in length, and is much esteemed as food when not exceeding 2 feet, larger ones are coarse. It resides in fresh or brackish water, being found within tidal influence. "It is a very strong active animal, and often leaps over the seine of the fishermen, on which account, when fishing for the *Catla*, they usually follow the net in canoes, and make a noise by shouting and splashing with their paddles." (Ham. Buchanan). It is said never to take a bait, but as it rises at natural flies, it could probably be taken with artificial ones.

Genus, 17—Thynnichthys, *Bleeker.*

Mola, pt. Blyth.

Pseudobranchiæ present. Abdomen rounded. Head somewhat compressed: integuments over snout thin: upper lip absent: only a short labial fold on the side of the mandible. Mouth rather wide, antero-lateral, with the lower jaw somewhat prominent. No barbels. Gill rakers short or absent. Eyes in the middle of the depth of the head, and without any adipose lid. Pharyngeal teeth molariform, compressed, close together, 5, 3 or 4, 2 or 3 | 3 or 2, 4 or 3, 5. *Dorsal fin short, without osseous ray: ventral commencing below the dorsal: anal short and entirely posterior to the dorsal. Scales small. Lateral-line complete, running to or a little below the centre of the base of the caudal fin. Intestinal tract narrow, and with numerous convolutions.*

This Genus is separated from the succeeding one (*Amblypharyngodon*), irrespective of its pharyngeal teeth, because of the position of the dorsal, ventral, and anal fins, and its having an entire instead of an interrupted lateral-line.

Geographical distribution.—The Kistna and Godavery rivers in India from the Deccan to their terminations: also the Malay Archipelago.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Thynnichthys sandkhol*, D. 12, A. 8, L. r. 120. Kistna and Godavery rivers.

1. Thynnichthys sandkhol, Plate CXXXIV, fig. 2.

Leuciscus sandkhol, Sykes, Trans. Zool. Soc. ii, p. 363; Bleeker, Beng. p. 68.
Mola sandkhol, Day, Journ. Linn. Society, xii, 1876, p. 574.
Thynnichthys Cochinensis,* Günther, Ann. and Mag. Nat. Hist. 1876, p. 401.
Kala-tala and *Ahku-chappah*, Tel.: *Bareing*, Ooriah.

B. iii, D. 12 ($\frac{3}{9}$), P. 19, V. 9, A. 8 ($\frac{3}{5}$), C. 19, L. r. 120, L. tr. 25-30/25.

Length of head 4 to $4\frac{1}{2}$, of caudal 4, height of body $3\frac{1}{4}$ to 4 in the total length. *Eyes*—in about the centre of the depth of the head, diameter 3 to 5 in the length of the head, 1 to $1\frac{1}{3}$ diameters from the end of snout, and $1\frac{1}{2}$ to $2\frac{1}{2}$ apart. Dorsal profile more convex than the abdominal. The width of the head equals 1/2, and the height 4/5, of its length. *Teeth*—pharyngeal, 5, 4, 3 | 3, 4, 5. *Fins*—dorsal 3/4 as high as the body, its upper edge concave, its origin is slightly in advance of that of the ventral, and about midway between the snout and base of the caudal fin, which latter is deeply lobed, the lower being the longer. Anal at some distance behind the vertical from the end of the dorsal. *Scales*—17 to 19 rows between the lateral-line and base of the ventral fin. *Colours*—silvery: head purplish.

Habitat.—Godavery and Kistna rivers, also the adjacent tanks. It attains above 18 inches in length.

Genus, 18—Amblypharyngodon, *Bleeker.*

Mola, Heckel and Blyth: *Brachygramma*, Day.

Pseudobranchiæ present. Abdomen rounded. Head somewhat compressed: integuments over snout thin: upper lip absent: only a short labial fold on the side of the mandible. Mouth rather wide, antero-lateral, with the lower jaw prominent. No barbels. Gill-rakers short or absent. Eyes in the middle of the depth of the head, and without any adipose membrane. Pharyngeal teeth molariform, with the crowns flat or concave, 3, 2, 1 | 1, 2, 3. *Dorsal fin short, without osseous ray, and extending to nearly or quite above the commencement of the anal: ventral in advance of the dorsal. Scales small. Lateral-line incomplete.*

Geographical distribution.—From Sind throughout the plains of India, Ceylon, and Burma.

SYNOPSIS OF SPECIES.

1. *Amblypharyngodon Atkinsonii*, D. 9-10, L. l. 55-65. Nine or ten rows of scales between lateral-line and base of ventral fin. Height of body $3\frac{1}{2}$ in the total length. Burma.

2. *Amblypharyngodon mola*, D. 9, L. l. 65-75. Nine or ten rows of scales between lateral-line and base of ventral fin. Height of body 4 to $4\frac{1}{4}$ in the total length. Sind, India (except the Malabar coast), Assam, and Burma.

3. *Amblypharyngodon microlepis*, D. 9, L. l. 55-60. Five rows of scales between the lateral-line and base of the ventral fin. Height of body $4\frac{3}{4}$ to 5 in the total length. Hooghly, through Orissa, and down the Coromandel coast to Madras.

4. *Amblypharyngodon melettinus*, D. 9-10, L. l. 50-57. Four rows of scales between lateral-line and base of the ventral fin. Height of body 5 to $5\frac{1}{2}$ in the total length. (? Bombay), Malabar coast, and Southern India from the Neilgherries to Madras: also Ceylon.

* The single skin described by Dr. Günther was erroneously stated to have come "from Cochin." It is a specimen which I personally obtained fresh, and preserved at Rajahmundry on the Godavery. I probably took it to the British Museum for comparison, and accidentally left it on the table.

1. Amblypharyngodon Atkinsonii, Plate CXXXIV, fig. 4.

? Leuciscus harengula, Cuv, and Val. xvii, p. 303, pl. 500.
Mola Atkinsonii, Blyth, J. A. S. of Beng., 1860, p. 164.
Nga-pan-ma, Burmese.

B. iii, D. 9-10($\frac{2-3}{7}$), P. 15, V. 9, A. 8($\frac{2}{6}$), C. 19, L. l. 55-65, L. tr. 14/12.

Length of head 4 to $4\frac{2}{3}$, of caudal 5, height of body $3\frac{1}{3}$ in the total length. *Eyes*—in the front half of the head, 4 to $4\frac{1}{4}$ diameters in the length of the head, 1 diameter from end of snout, and $1\frac{1}{2}$ apart. Abdominal and dorsal profiles about equally convex. *Teeth*—pharyngeal, compressed and with flat crowns, 3, 2, 1/1, 2, 3. *Fins*—dorsal 2/3 as high as the body, its upper edge concave, it commences nearly midway between the anterior edge of the eye and the base of the caudal fin, and slightly behind the origin of the ventral. Anal arises on the vertical just posterior to the end of the dorsal. *Lateral-line*—ceases after 19 scales; there are 9 or 10 rows between it and the base of the ventral fin. *Colours*—silvery, with a golden gloss about the head.

This species is identical with an example of *Leuciscus harengula*, Cuv. and Val. shown to me as the type at Paris, but which does not quite agree either with the figure or with the description.

Habitat.—Throughout native and British Burma. It attains at least 6 inches in length.

2. Amblypharyngodon mola, Plate CXXXV, fig. 4.

Cyprinus mola, Ham. Buch., pp. 334, 392, pl. 38, f. 92; Cuv. and Val. xvi, p. 440.
Leuciscus mola, McClelland, Ind. Cypr. pp. 293, 407; Bleeker, Beng. en Hind. p. 140.
? Leuciscus chitul, Sykes, T. Z. S. ii. p. 363.
Amblypharyngodon mola, Bleeker, Prod. Cyp. p. 409; Günther, Catal. vii, p. 202.
Mola Buchanani, Blyth, J. A. S. of Beng. 1860, p. 164.
Rhodeus macrocephalus ? Jerdon, M. J. L. and S. 1849, p. 324.
Talla-maya, Tel.: *Morara*, Ooriah: *Moah*, Assam: *Mukni*, Punj.: *Nga-beh-byoo* and *Nga-zen-zap*, Burmese.

B. iii, D. 9($\frac{2}{7}$), P. 15, V. 9, A. 7($\frac{2}{5}$), C. 19, L. l. 65-75. L. tr. 12/12.

Length of head about 5, of caudal 5, height of body 4 to $4\frac{1}{4}$ in the total length. *Eyes*—diameter $3\frac{1}{2}$ to 4 in the length of head, 3/4 to I diameter from the end of snout, and $1\frac{1}{4}$ apart. Dorsal profile more convex than that of the abdomen. *Fins*—origin of dorsal midway between front edge of eye and base of the caudal, it is behind the insertion of the ventral, its upper edge is concave. Caudal deeply forked. *Lateral-line*—extends along about 15 scales, and there are 9 or 10 rows between it and the base of the ventral fin. *Colours*—a silvery lateral band, and usually dark markings on the dorsal, caudal, and anal fins.

In some specimens from the Irrawaddi, I found the scales rather large, L. l. 65, and the origin of the dorsal directly above the insertion of the ventral.

Habitat.—From Sind throughout India, (except the Malabar Coast,) Assam and Burma.

3. Amblypharyngodon microlepis, Plate CXXXV, fig. 5.

? Leuciscus pellucidus, McClelland, Ind. Cyp. pp. 293, 408.
Leuciscus microlepis, Bleeker, Beng. en Hind. p. 141.
Amblypharyngodon microlepis, Bleeker, Prod. Cyp. 409; Kner, Novara Fische, p. 349.
Amblypharyngodon pellucidus, Günther, Catal. vii, p. 202.

B. iii, D. 9($\frac{2}{7}$), P. 14, V. 9. A. 7($\frac{2}{5}$), C. 19, L. l. 55-60, L. tr. 11/8.

Length of head $4\frac{3}{4}$ to 5, of caudal $4\frac{1}{2}$ to $4\frac{3}{4}$, height of body $4\frac{3}{4}$ to 5 in the total length. *Eyes*—diameter $3\frac{2}{3}$ to 4 in the length of the head, less than 1 diameter from the end of snout. Dorsal profile rather more convex than that of the abdomen. *Fins*—origin of dorsal midway between middle or hind edge of eye and base of the caudal fin, and slightly behind the origin of the ventral, its upper edge concave, its last ray is divided to its base: caudal forked, lower lobe the longer. *Lateral-line*—ceases after a few scales, 5 rows between it and the base of the ventral fin. *Colours*—a rather broad silvery lateral band.

This species is distinguished by the much fewer number of scales (4 or 5) between the row which carries the lateral-line and the base of the ventral fin, than is seen in the common (9 to 10) *A. mola*.

McClelland's fish may be an elongated example of *A. mola*, I have not taken this species in Assam.

Habitat.—From the Hooghly through Orissa and down the Coromandel Coast to Madras.

4. Amblypharyngodon melettinus, Plate CXXXIV, fig. 3.

Leuciscus melettinus, Cuv. and Val. xvii, p. 304, pl. 501; Jerdon, M. J. L. and Sc. 1849, p. 322.
Rhodeus Indicus, Jerdon, M. J. L. and Sc. 1849, p. 324.
Brachygramma Jerdoni, Day, Proc. Zool. Soc. 1865, p. 304.
Amblypharyngodon Jerdoni, Day, Fishes of Malabar, p. 217, pl. 17, f. 1.
Amblypharyngodon melettinus, Günther, Catal. vii, p. 202.
Wumboo, Mal.: *Oolaree*, Tam.: *Kali-korafi*, Hind., *Paraga*, Can.

B. iii, D. 9-10($\frac{2}{7}$-$\frac{3}{}$), P. 15, V. 9, A. 7-8($\frac{2}{5}$-$\frac{3}{}$), C. 19, L. l. 50-57, L. tr. 10/8.

Length of head 5 to 5½, of caudal 5, height of body 5 to 5½ in the total length. *Eyes*—4 diameters in the length of the head, 1 diameter from end of snout, and 1¼ apart. *Teeth*—pharyngeal, with rather concave summits, 3, 2, 1/1, 2, 3. *Fins*—origin of dorsal is behind the insertion of the ventral, its upper edge concave: caudal rather deeply forked. *Lateral-line*—extends along 15 to 20 rows of scales, 4 rows between it and the base of the ventral fin. *Colours*—greenish along the back, becoming silvery on the sides and beneath, a bright greenish-yellow band, divides the colours of the back from a silvery line passing along the side.

In Cuv. and Val.'s figure the lateral-line is uninterrupted, also there are too many scales between it and the base of the ventral fin.

Habitat.—(Bombay, according to Cuv. and Val.) Malabar Coast, and southern India, from the Neilgherries to Madras, also Ceylon.

Genus, 19—Barbus, *Cuvier and Valenciennes.*

Puntius, pt. Ham. Buch.: *Labeobarbus*, *Varicorhinus*, pt. Rüpp.: *Systomus*, pt. McClell.: *Capoëta*, sp. Cuv. and Val.: *Pseudobarbus*, Bielz.: *Luciobarbus*, Heckel: *Cheilobarbus*, sp. Smith: *Balantiocheilus*, *Hemibarbus*, *Cyclocheilichthys*, *Siaja*, *Anematichthys*, *Hypselobarbus*, *Gonoproktopterus*, *Gnathopogon*, *Hampala*, sp. Bleeker: *Enteromius*, sp. Cope.

Mouth arched, and anterior or inferior: jaws closely invested by the lips, which may have leathery lobes, but no horny covering. Barbels four (Barbodes,* Bleeker) *: or two (Capoëta,* Cuv. and Val.) *: or none (Puntius,* H. Buch.). *Eyes without adipose lids. Pharyngeal teeth* 5 or 4, 3 or 4, 2 or 3 | 2 or 3, 3 or 4, 4 or 5. *Dorsal fin rather short, commencing nearly opposite the root of the ventral: its last undivided ray being either ossified and serrated or entire, or articulated and not osseous: anal rather short, in some species its second ray ossified, or its last undivided ray may even be serrated (B. prodozyson,* Bleeker). *Scales large, of moderate or small size: anal scales not enlarged. Lateral-line may be complete, or incomplete,† when the former it is continued to opposite the centre of the base of the caudal fin.*

This most extensive Genus has been subdivided by various authors into numerous genera and sub-genera, but, passing gradually one into another, they have in the majority of instances failed to be permanently accepted. The three sub-genera of those with 4, 2, or 0 barbels are useful and apparently correct, for the occasional abnormal absence of one or more of these appendages in fish which are so extensively kept in an artificial state in tanks, does not appear sufficient reason why such natural subdivisions should be excluded from Ichthyological systems.

It is remarkable how very similar the *Barbus Mahicola*, C.V. which has 2 barbels, is to the *B. filamentosus*, C.V. with none. If a number of examples are examined it will be found that in some these appendages are very minute, the barbels being, as a rule, smallest in specimens obtained furthest from the hills. In South Canara, the Wynaad, and base of the Neilgherries, where the barbels are large, the *B. Mahicola* abounds: towards Cochin and up the Coromandel coast as far as Madras they are small or absent, and the *B. filamentosus* is the type. Here, undoubtedly, the question must force itself on one's notice, are we dealing with two distinct species, or one in a state of transition? If the latter, which is the original form? The adult of *Barbus punctatus* and *B. phutunio* are often exactly similar, but in the immature form the first retains its original colour, not so the second. *Barbus chola* and *B. tetrarupagus* are similar, except as to the presence of a black spot behind the opercle in the latter: whilst *Barbus ticto* shows considerable variations. Great changes evidently occur in some species if they are removed to another locality, thus *Barbus conchonius*, which has been imported from the plains and introduced into the Nainee tal lake is evidently losing the serrature of its dorsal spine, in time, if this change goes on, the species will become more like *B. terio* than the original form.

The majority of those species which constitute the sub-genus *Barbodes* (4 barbels), provided they are soberly coloured, attain a large size: the brilliant coloured ones are mostly residents of clear and rapid mountain streams or rivers contiguous to hills and are generally small. A strong dorsal spine is usually (if not invariably) a sign that the species is one that lives in the vicinity of high mountains up the streams of which it ascends to breed. an exception, however, has to be made of those forms having serrated dorsal spines, and which are usually residents of waters of the plains. Considerable individual variations exist as to the comparative length and size of the dorsal spine, as a rule it increases in strength in the adult. In immature examples the last undivided dorsal ray may appear to be articulated in the young, although it is osseous in the adult.

Species of the sub-genus *Capoeta* (2 barbels) never attain the size reached by many of the *Barbodes*: some, more especially when residing in mountain streams, have vivid colours. The species of the sub-genus *Puntius* are mostly of small size, whilst a few are brilliantly coloured.

Amongst these sub-genera a most natural subdivision appears to be into those with the last undivided dorsal ray osseous and serrated or smooth, or others in which the bony element is absent: whilst even further subdivisions are easily made, if desired, into whether the fin rays are elongated, or the lateral-line is complete or incomplete.

* *Barbus lithopidos* is an exception.

† In counting the numbers of rows of scales between the lateral-line and insertion of the ventral fin, such is done in species in which the former is incomplete, from the row of scales on which the lateral-line would have existed had it been completed.

Geographical distribution.—Europe, and throughout Asia and Africa. Representatives of this genus exist in most, if not all, Indian and Burmese rivers and tanks, the larger species being generally termed Mahseers. Some attain an enormous size as 90 lb. and upwards, these are more residents in rivers along the bases of hills or large rapids, but a few have even a more extended range. The number of species appears to diminish as the Malay Archipelago is approached, whilst those forms having 4 barbels and also with an osseous and serrated dorsal ray largely increase in proportion to the others.

SYNOPSIS OF SPECIES.

A.—*With four barbels*, (*Barbodes.*)

a. Last undivided dorsal ray, osseous and serrated.

1. *Barbus chagunio*, D. 3/8, A. 3/5, L. l. 44-47. Pores on snout and head. Colours uniform. Orissa, Bengal and N.W. Provinces, and Assam.

2. *Barbus clavatus*, D. 3/8, A. 3/5, L. l. 42. Pores on snout. Colours uniform. Sikhim.

3. *Barbus sarana*, D. 3-4/8, A. 3/5, L. l. 32-34. Colours uniform: in Burma the caudal has a dark inner edge. Sind, India, Ceylon and Burma.

4. *Barbus chrysopoma*, D. 4/8, A. 3/5, L. l. 28-30. A dark lateral blotch. Coasts of India, Deccan, Madras, and Darjeeling.

5. *Barbus pinnauratus*, D. 3/8, A. 3/5, L. l. 27-29. A black lateral blotch, fins orange. Bombay, Canara, and down the Malabar Coast to Ceylon, Southern India, and up the Coromandel Coast at least as high as Coconada.

6. *Barbus pleurotænia*, D. 3/8, A. 2/6, L. l. 28. A black band from eye to middle of tail. Ceylon.

7. *Barbus goniosoma*, D. 3/8, A. 2/5, L. l. 24. Serrated dorsal ray weak. Colours uniform. Mergui, to Sumatra.

8. *Barbus roseipinnis*, D. 3/8, A. 2/5, L. l. 22. Caudal, anal, and ventrals red. Pondicherry.

b. Last undivided dorsal ray, osseous and entire.

9. *Barbus dubius*, D. 4/9, A. 2/5, L. l. 42. No pores on snout. 5 rows of scales between l. l. and base of ventral fin. Dorsal spine strong, nearly as long as head. Bowany river in Madras.

10. *Barbus micropogon*, D. 4/9, A. 2-3/5, L. l. 39-41. Dorsal spine strong, a little longer than the head, 3 rows of scales between l. l. and base of ventral fin. Mysore, Bowany river in Madras, and Western Coast.

11. *Barbus chilinoides*, D. 3/7-8, A. 2/5, L. l. 32-35. Lower lip with a continuous transverse fold. Dorsal spine strong. 3 rows of scales between l. l. and base of ventral fin. Ganges, Himalayas and Assam.

12. *Barbus Carnaticus*, D. 4/8, A. 2/5, L. l. 30-32. Lower labial fold interrupted. Dorsal spine strong. 3½ rows of scales between l. l. and base of ventral fin. Bowany river in Madras, and Western Coast.

13. *Barbus hexagonolepis*, D. 3/9, A. 2/5, L. l. 28-31. Lower labial fold interrupted. Dorsal spine strong, as long as the head excluding the snout. 2 to 2½ rows of scales between l. l. and base of ventral fin. Assam.

14. *Barbus Dukai*, D. 4/9, A. 2/5, L. l. 28-29. Lower labial fold interrupted. Large pores on cheeks. Dorsal spine strong, as long as head excluding the snout. 2½ rows of scales between l. l. and base of ventral fin. Darjeeling.

15. *Barbus tor*, D. 3/9, A. 2/5, L. l. 25-27. Dorsal spine strong, as long as the head excluding the snout. Upper jaw the longer, lips lobed. 2½ rows of scales between l. l. and base of ventral fin. Rapids throughout India.

16. *Barbus hexastichus*, D. 3-4/9, A. 2/5-6, L. l. 25-26. Dorsal spine strong. 2½ rows of scales between l. l. and base of ventral fin. Himalayas, River Jumna, and perhaps Ceylon.

17. *Barbus Bovanicus*, D. 3/9, A. 3/5, L. l. 24-26. Lower labial fold entire. Dorsal spine of moderate strength and as long as the head excluding the snout. 2½ rows of scales between l. l. and base of ventral fin. Bowany river in Madras.

18. *Barbus sophore*, D. 3/9, A. 2/5, L. l. 25. Dorsal spine weak, 2½ rows of scales between l. l. and base of ventral fin. Assam and Khasia hills.

19. *Barbus Stracheyi*, D. 2/9, A. 2/5, L. l. 23. Dorsal spine strong. 2½ rows of scales between l. l. and base of ventral fin. Tenasserim and Burma.

*c. Last undivided dorsal ray articulated, or if osseous very weak.**

20. *Barbus curmuca*, D. 3/9, A. 3/5, L. l. 41. 3½ rows of scales between l. l. and base of the ventral fin. Western ghauts of India.

21. *Barbus lithopidos*, D. 3/9, A. 3/5, L. l. 38-39. 4 rows of scales between l. l. and base of the ventral fin. Of a slate-colour. South Canara.

22. *Barbus Thomassi*, D. 3-4/9, A. 3/5. L. l. 31-34. 2½ rows of scales between l. l. and base of the ventral fin. Each scale with a red mark: dorsal and caudal fins lake colour. South Canara.

23. *Barbus spinulosus*, D. 3/9, A. 3/7. Sikhim.

* I have included those species in which the last undivided ray is not enlarged, but some of which have its lower portion more or less osseous in the adult stage.

24. *Barbus pulchellus*, D. 3/9, A. 2/5, L. l. 30-32. $3\frac{1}{2}$ rows of scales between l. l. and base of ventral fin. Upper half of body dark coloured: a light band from eye to caudal fin. Canara.

25. *Barbus Dobsoni*, D. 3-4/9, A. 3/5, L. l. 30-32. Length of head 6 in the total. $3\frac{1}{2}$ rows of scales between l. l. and base of ventral fin. Poona and the Deccan.

26. *Barbus Jerdoni*, D. 3/9, A. 3/5, L. l. 27-28. Length of head 5 to $5\frac{1}{4}$ in the total. $2\frac{1}{2}$ to $3\frac{1}{2}$ rows of scales between l. l. and base of ventral fin. Canara.

27. *Barbus Wynaadensis*, D. 4/8, A. 3/5, L. l. 26-28. $2\frac{1}{2}$ to 3 rows of scales between l. l. and base of ventral fin. Wynaad hills.

28. *Barbus Stevensonii*, D. 3/9, A. 3/5, L l. 27. $2\frac{1}{2}$ rows of scales between l. l. and base of ventral fin. Akyab.

29. *Barbus Neilli*, D. 4/9, A. 3/5, L. l. 24-26. $3\frac{1}{2}$ rows of scales between l. l. and base of ventral fin. Kurnool and the Deccan.

30. *Barbus Malabaricus*, D. 3-4/9, A. 3/5, L. l. 24. $1\frac{1}{2}$ rows of scales between l. l. and base of the ventral fin. Western ghauts of India.

31. *Barbus innominatus*, D. 3/9, A. 2/5, L. l. 24. 3 rows of scales between l. l. and base of ventral fin. Ceylon.

32. *Barbus compressus*, D. 3/9, A. 3/5, L. l. 22. $3\frac{1}{2}$ rows of scales between l. l. and base of ventral fin. Cashmere?

33. *Barbus Blythii*, D. 3/9, A. 3/5, L. l. 22. $2\frac{1}{2}$ rows of scales between l. l. and base of ventral fin. Tenasserim.

34. *Barbus melanampyx*, D. 3/8, A. 2/5, L. l. 20. 2 rows of scales between l. l. and base of ventral fin. Red, with three vertical black bands. Rivers along Western Ghauts as low as Travancore.

B.—*With two barbels (Capoëta).*

a. With osseous, serrated, dorsal ray.

35. *Barbus macrolepidotus*, D. 4/8, A. 2/6, L. l. 26. $2\frac{1}{2}$ rows of scales between l. l. and base of ventral. Tavoy to the Malay Archipelago.

b. Osseous dorsal ray, entire.

36. *Barbus chola*, D. 3/8, A. 2/5, L. l. 26-28. Narrow suborbitals. 3 to $3\frac{1}{2}$ rows of scales between l. l. and base of ventral fin. A lateral blotch, and two bands on dorsal fin. India and Burma.

37. *Barbus parrah*, D. 3/8, A. 3/5, L. l. 25. Wide suborbitals. $3\frac{1}{2}$ rows of scales between l. l. and base of ventral fin. A dark lateral blotch. Southern India and Malabar.

38. *Barbus Burmanicus*, D. 4/8, A. 2/5, L. l. 26. 2 rows of scales between l. l. and base of ventral fin. Burma.

39. *Barbus tetrarupagus*, D. 2-3/8, A. 2/5, L. l. 24-26. $3\frac{1}{2}$ rows of scales between l. l. and base of ventral fin. A black spot behind gill-opening, a second near base of caudal fin: a band on dorsal fin. Sind, India (except Mysore, Madras and the Western coast).

40. *Barbus dorsalis*, D. 3-4/8, A. 3/5, L. l. 24-25. $2\frac{1}{2}$ rows of scales between l. l. and base of ventral fin. A black spot at end of base of dorsal fin. Mysore, Southern India and Ceylon.

c. Last undivided dorsal ray articulated, or if osseous very weak.

41. *Barbus kolus*, D. 3-4/9, A. 3/5, L. l. 40-43. 4 to 5 rows of scales between l. l. and base of ventral fin. Deccan, and throughout the Kistna river, Central Provinces.

42. *Barbus Denisonii*, D. 2-3/8, A. 3/5, L. l. 28. $2\frac{1}{2}$ rows of scales between l. l. and base of ventral fin. Body longitudinally banded. Hill ranges of Travancore.

43. *Barbus melanostigma*, D. 2/8, A. 2/5. 3 rows of scales between l. l. and base of ventral fin. A light band along the side: a deep black lateral blotch. Wynaad hills, also Bowany and Cauvery rivers.

44. *Barbus arenatus*, D. 2/8, A. 3/5, L. l. 26. $3\frac{1}{2}$ rows of scales between l. l. and base of ventral fin. Madras.

45. *Barbus Puckelli*, D. 2/7, A. 3/5, L. l. 24. $2\frac{1}{2}$ rows of scales between l. l. and base of ventral fin. A black mark along the base of dorsal fin. Mysore.

46. *Barbus amphibius*, D. 2-3/8, A. 2/5, L. l. 23-24. 2 rows of scales between l. l. and base of ventral fin. A dark lateral blotch sometimes present. Western coast of India, Deccan, and Southern India.

47. *Barbus arulius*, D. 3/8, A. 2/5, L. l. 23. $2\frac{1}{2}$ rows of scales between l. l. and base of ventral fin. Body vertically banded. Western Ghauts and Bowany river.

48. *Barbus Mahicola*, D. 3/8, A. 2/5 L. l. 21. $2\frac{1}{2}$ rows of scales between l. l. and base of ventral fin. A deep lateral blotch. Western and Southern India, also Ceylon.

C.—*Without barbels (Puntius).*

a. With osseous serrated dorsal ray.

49. *Barbus apogon*, D. 4/8, L. l. 36, complete. $5\frac{1}{2}$ rows of scales between l. l. and ventral fin. Each scale with a dark base. Burma to the Malay Archipelago.

50. *Barbus ambassis*, D. 3/8, L. l. 36, incomplete. 6 rows of scales between lateral-line and ventral fin. A black lateral blotch, another at base of anterior dorsal rays. Southern India, Orissa, Bengal and Assam.

51. *Barbus conchonius*, D. 3/8, L. l 26, incomplete; $4\frac{1}{2}$ rows between lateral-line and ventral fin. A black spot on side over anal fin. From the Punjab throughout Bengal, the Deccan, Orissa and Assam.

52. *Barbus ticto*, D. 3/8, L. l. 23-26, incomplete. Two black spots, one at commencement of lateral-line, another at the side of the tail. Throughout India.

53. *Barbus Stoliczkanus*, D. 2/8, L. l. 25, complete. Two black marks on lateral-line. Darjeeling and Burma.

54. *Barbus punctatus*, D. 3/8, L. l. 23, complete. Two black spots one below the commencement of lateral-line, the other near its termination. Malabar coast and Madras.

55. *Barbus gelius*, D. 3/8, L. l. 25, incomplete. A black band over tail, a black spot across the bases of the first 6 dorsal rays, and another over base of anal. Orissa, Bengal, and Assam.

56. *Barbus phutunio*, D. 2-3/8, L. l. 20-23, incomplete. Four vertical black bands on a brown body, and a dark one down the centre of the dorsal fin. Bengal, Orissa, Ganjam and Assam.

57. *Barbus Cumingii*, D. 3/8, A. 3/5, L. l. 21, incomplete. 3 rows of scales between l. l. and base of ventral fin. Two dark vertical bands. Ceylon.

58. *Barbus nigrofasciatus*, D. 3/8, L. l. 20, complete. Three vertical black bands on body. Southern Ceylon.

59. *Barbus guganio*, D. 2/8, L. l. incomplete. Bengal and Assam.

b. Osseous dorsal ray, entire.

60. *Barbus stigma*, D. 3/8, L. l. 23-36, complete. A dark mark near the posterior extremity of the lateral-line, another across the base of the middle dorsal rays, Throughout India and Burma.

61. *Barbus chrysopterus*, D. 3/8, L. l. 23-25, complete. Fins black tipped. Sind, Punjab, N. W. Provinces, Assam, N. India.

62. *Barbus thermalis*, D. 3/8, A. 3/5, L. 24, incomplete. $3\frac{1}{2}$ rows of scales between l. l. and base of ventral fin. A dark mark at side of base of tail. Ceylon.

63. *Barbus terio*, D. 3/8, L. l. 21-23, incomplete. A black mark on side above the anal fin, sometimes continued by a band to the caudal, a second indistinct one under posterior end of dorsal. Orissa, Bengal, and Punjab.

c. Last undivided dorsal ray articulated, or if osseous very weak.

64. *Barbus Punjabensis*, D. 3/8, L. l. 43, incomplete. A silvery band along the side, a black spot at base of caudal, and two first dorsal rays black. Lahore in the Punjáb, also Jubbulpore.

65. *Barbus unimaculatus*, D. 3/8, L. l. 24, incomplete. A black mark at base of each dorsal ray. Sitang river in Burma.

66. *Barbus Waagenii*, D. 2-3/8, A. 2/5, L. l. 23, incomplete. A lateral blotch. Punjab salt-range.

67. *Barbus cosuatis*, D. 3/8, L. l. 22, incomplete. Uniform, a dark spot across the middle of the anterior dorsal rays. Throughout India.

68. *Barbus vittatus*, D. 2/8, L. l. 20-22, incomplete. Four black spots on the side, and a black streak down the dorsal fin. Cutch, Malabar, Mysore and Madras.

69. *Barbus filamentosus*, D. 3/8, L. l. 21, complete. Branched dorsal rays elongated. A black mark near posterior end of lateral-line, and each caudal lobe with a black extremity. Malabar coast and Southern India.

70. *Barbus puntio*, D. 3/8, L. l. 23, incomplete. A black band encircles the free portion of the tail. Bengal and Burma.

A.—*With four Barbels (Barbodes).*

a. Last undivided dorsal ray, osseous and serrated.

1. Barbus chagunio, Plate CXXXVI, fig. 2 (*variety spilopholus*), and CXL, fig. 2.

Cyprinus chagunio, Ham. Buch. Fishes of Ganges, pp. 295, 387.
Rohita chagunio, Cuv. and Val. xvi. p. 257.
Barbus chagunio, *spilopholus* and *sarana*, (not H. B.) McClell. Ind. Cyp. pp. 272, 341, pl. 9, f. 4; Bleeker, Beng. p. 60; Day, Proc. Zool. Soc. 1869, p. 373.
Barbus spilopholis, Cuv. and Val. xvi, p. 171; Günther, Catal. vii, p. 96.
Barbus Beavani, Günther, Catal. vii, p. 96.
Jerruah, Beng.: *Chaguni*, Behar.: *Pootee keintah*, Assam.

B. iii, D. 11($\frac{3}{8}$), P. 15, V. 9, A. 8($\frac{3}{5}$), C. 19, L. l. 44-47, L. tr. 11/9.

Length of head $4\frac{1}{2}$ to 5, of caudal 5, height of body 4 to $4\frac{1}{4}$ in the total length. *Eyes*—diameter 5 to $6\frac{1}{2}$ in length of head, 2 to 3 diameters from end of snout, $1\frac{1}{2}$ diameters apart. Suborbital region, cheeks and anterior superior margin of the orbit usually covered with numerous pores. Mouth somewhat inferior but directed forwards. *Barbels*—both pairs rather longer than the orbit. *Fins*—dorsal commences midway between the end of the snout and the base of the caudal fin, its last undivided ray is osseous, strong, with coarse teeth: its length equals rather more than that of the head excluding the snout: some of the last few anal rays in large specimens may be elongated, (*B. spilophilus*), but more frequently not so. *Lateral-line*—complete,

with from $5\frac{1}{2}$ to $6\frac{1}{2}$ rows of scales between it and the base of the ventral fin: 15 rows before the dorsal fin. Free portion of the tail as high as long. *Colours*—uniform silvery, with a pinkish tinge, the scales towards the back sometimes being darkest at their bases: fins reddish with light outer edges, the summit of the dorsal fin sometimes black. The young have a silvery band along the side.

McClelland mistook H. Buchanan's figure of the *Cyprinus chagunio*, (it was marked *C. kunta*) for *Barbus sarana*, but found out his error previous to publishing the figure (which he consequently suppressed). That a fish, "the same with the *kunamoo* of Dr. Russell," as Buchanan describes the *sarana*, can be identical (as advanced by Dr. Günther) with *C. kuntá* is incredible. H. Buchanan in his MSS. list of fish observes, "The *Darangi* of the Tistá is, in some places called *kuntá*. It has a great affinity with the *Curmuca* which is described in my account of Mysore." The *C. chagunio*, of which the figure labelled *C. kunta* is the representative, is placed next to the *C. curmuca*, and it is stated p. 294, "This and the following species have a great resemblance to the *Cyprinus cirrhosus* of Bloch: but the callosities of the head are neither mentioned in Bloch's description nor represented in his figure;" showing how alike he must have considered the two to be. If *C. kunta* is not *C. chagunio*, what does it represent? and where is the figure of *chagunio*?

Habitat.—From Orissa, throughout Bengal, Assam, Behar and the N. W. Provinces to the Punjab, but not recorded from Sind, the Deccan, Western coast, Mysore, Madras, or Burma. It attains at least 18 inches in length.

The figure of the variety *B. spilopholus* (Plate CXXXVI) is from an Assam example, 7·5 inches in length: that on plate CXL. is from a Delhi specimen.

2. Barbus clavatus.

McClelland, Cal. Journ. Nat. Hist. 1845, p. 280, pl. 21, f. 2; Günther, Catal. vii, p. 97.

B. iii. D. 11($\frac{3}{8}$), P. 16, V. 10, A. 8($\frac{3}{5}$), C. 19, L. l. 42, L. tr. 6/4.

Height of the body 1/4 of the length excluding the caudal fin. *Eyes*—large and in the middle of the length of the head. Snout covered with small thorny tubercles. *Barbels*—two well-developed pairs. *Fins*—last undivided dorsal ray osseous, strong, serrated, and as long as the body is high. *Scales*—$11\frac{1}{2}$ rows in an oblique line from the base of the ventral to the dorsal. The figure shows $4\frac{1}{2}$ rows between the lateral-line and base of the ventral which would give $6\frac{1}{2}$ above the lateral-line. *Colours*—blue superiorly becoming white beneath: the fins pale bluish white.

Habitat.—A single specimen (7 inches long) was obtained from a river at the base of the Sikhim mountains in Bengal.

3. Barbus sarana, Plate CXXXVI, fig. 2.

Cyprinus kunnamoo, Russell, Fish. Vizag. ii, p. 82, pl. 204.
Cyprinus kakoo and *kadoon*, Russell, l. c. p. 83.
Cyprinus sarana, Ham. Buch. Fish. Ganges, pp. 307, 388.
Barbus deliciosus, McClelland, Ind. Cyp. pp. 272, 342, pl. 39, fig. 3; Cuv. and Val. xvi, p. 172; Bleeker, Beng. p. 60.
Systomus immaculatus and *chrysostomus*, McClelland, l. c. pp. 284, 380, pl. 44, f. 5; Cuv. and Val. xvi, p. 409; Bleeker, Beng. p. 62.
Barbus sarana, Cuv. and Val. xvi. p. 151; Bleeker, Beng. p. 60; Jerdon, M. J. L. and Sc. 1849, p. 312; Günther, Catal. vii, p. 115; Day, Proc. Zool. Soc. 1869, p. 374.
Barbus gardonides, Cuv. and Val. l. c. p. 156, pl. 465; Bleeker, Beng. p. 60, 126.
Barbus kakus and *Duvaucelli*, Cuv. and Val. xvi, pp. 153, 167.
Cyprinus McClellandi, Cuv. and Val. xvi, p. 390.
Barbus kakus and *kadoon*, Bleeker, Beng. p. 60.
Barbus caudimarginatus, Blyth. J. A. Soc. of Beng. 1860, p. 157.
Puntius sarana, Steind. Sitz. Ak. Wiss. Wien, lvi, 1867, p. 58.
Barbus immaculatus and *Russellii*, Günther, Catal. vii, p. 121.
Pungella, Tam.: *Giddi-kaoli*, *Durhie* and *Potah*, Hind.: *Gid-pakke*, Can.: *Kannaku*, Tel.: *Sarana*, Ooriah and Beng.: *Jundoori*, Punj.: *Pop-pree* and *Kuh-nah-nee*, Sind.: *Sen-nee*, Assam: *Nga-khon-mah-gyee* and *Nga-chong*, Burmese.

B. iii, D. 11($\frac{3}{8}$), P. 15, V. 9, A. 8($\frac{3}{5}$), C. 19, L. l. 32-34, L. tr. $5\frac{1}{2}$-6/6.

Length of head 5 to $5\frac{1}{4}$, of caudal 5, height of body $3\frac{1}{4}$ to $3\frac{2}{3}$ in the total length. *Eyes*—diameter $4\frac{1}{4}$ to $4\frac{3}{4}$ in the length of head, 1 to $1\frac{1}{3}$ diameters from the end of snout, and 2 diameters apart. Profile of the back elevated. Interorbital space convex. Lower labial fold interrupted. No pores on the snout. *Barbels*—the rostral pair about as long as the orbit, the maxillary pair longer, sometimes equalling $1\frac{1}{2}$ diameters of the orbit. *Fins*—dorsal commences slightly nearer the snout than the base of the caudal fin and opposite the insertion of the ventral, its last undivided ray osseous, strong in the adult, finely serrated posteriorly, and with its stiff portion 2/3 as long as the head, the fin is 1/2 to 2/3 as high as the body, with its upper edge concave. *Lateral-line*—complete, from $3\frac{1}{2}$ to 4 rows of scales between it and the base of the ventral fin: 10 to 11 rows before the dorsal fin. *Colours*—silvery, darkest superiorly, opercles shot with gold: the young have occasionally a dull

blotch on the lateral-line before the base of the caudal fin. Mostly some dark spots behind the opercle. When the fish is fresh there are sometimes horizontal bands along the rows of scales in the upper half of the body. Fins whitish or yellowish-white, and externally stained with gray.

In some Deccan specimens the eye is sometimes as large as 1/4 of the length of the head. As a rule in adult specimens the length of the head is about 1/4 of the total length excluding the caudal fin. The body in the young is more compressed and somewhat higher than in the adult.

Barbus sarana, McClelland, is *B. chagunio*, Ham. Buch. The two type specimens *B. russelli*, Günther, from Sind, have L. l. 32-34 (not 27 as stated). *Barbus rodactylus*, McClelland, Ind. Cyp. p. 273, from Lower Assam, has no characters pointed out by which it may be distinguished from the above.

Habitat.—Sind and the Punjab, throughout India, Assam and Burma, in which latter country the caudal fin has sometimes a black upper and lower edge and a dark mark at the base of each scale. It attains at least a foot in length. The specimen figured (9 inches long) was from Assam.

4. Barbus chrysopoma.

Cuv. and Val. xvi, p. 165, pl. 466; Bleeker, Beng. p. 60; Day, Fishes of Malabar, p. 208; Günther, Catal. vii, p. 113.

? Barbus Polydori, Cuv. and Val. xvi, p. 170; Bleeker, Beng. p. 60.

Systomus chrysopoma, Jerdon, Madras Journ. Lit. and Sc. 1849, p. 314.

Munduttee, Mal.

B. iii, D. 12 ($\frac{4}{8}$), P. 17, V. 9, A. 8 ($\frac{3}{5}$), C. 19, L. l. 28-30, L. tr. 6/6.

Length of head $4\frac{1}{3}$ to 5, of caudal $4\frac{1}{2}$, height of body $3\frac{2}{3}$ in the total length. *Eyes*—diameter $3\frac{1}{4}$ to $3\frac{1}{2}$ in the length of the head (at 2·6 inches in length the eye is at least $2\frac{1}{4}$ in the length of the head), 1 diameter from the end of snout, and 1 to $1\frac{1}{4}$ apart. Height of head almost equals its length. Profile of back somewhat elevated. Interorbital space flat. Lower labial fold interrupted. *Barbels*—the rostral very thin, not so long as the eye: the maxillary as long as the orbit. *Fins*—dorsal commences midway between the front edge of the eye and the base of the caudal fin and opposite the insertion of the ventral, its last undivided ray osseous, of moderate strength, finely serrated posteriorly, and with its stiff portion as long as the head excluding the snout: the height of the fin is 2/3 to 3/4 that of the body below it, its upper edge concave. *Lateral-line*—complete, and a little more concave than in the next species, whilst it is sometimes sinuous in the last part of its course, 4 rows of scales between it and the base of the ventral fin: 12 rows before the base of the dorsal fin. *Colours*—dark silvery, lightest beneath, opercles shot with purple and gold. A dark vertical band behind the opercles and a dull spot on the lateral-line just anterior to the base of the caudal fin. Upper and lower margins of the caudal grayish: the other fins golden.

The eyes in this species are larger and not so far apart as in *B. sarana*: the length of the head in adults becomes shorter, and the eye larger, and the interorbital space flat.

Habitat.—Fresh waters along the coasts of India from Cutch to Bengal, also the Deccan, Mysore, and Madras. I have likewise received it from Darjeeling.

5. Barbus pinnauratus, Plate CXXXIX, fig. 3.

? Barbus gibbosus and *subnasutus*, Cuv. and Val. xvi, pp, 154, 155; Bleeker, Beng. p. 60.

Puntius (Barbodes) chrysopoma, Bleeker, Ceylon, p. 15, t. 3, f. 1 (not Cuv. and Val.).

Cyclocheilichthys pinnauratus, Day, Proc. Zool. Soc. 1865, p. 300.

Puntius pinnauratus, Day, Fish. Malabar, p. 209, pl. xv, f. 2.

Barbus pinnauratus, Günther, Catal. vii, p. 114.

Barbus spilurus, Günther, Catal. vii, p. 114.

B. iii, D. 11 ($\frac{3}{8}$), P. 17, V. 8, A. 7 ($\frac{2}{5}$), C. 19, L. l. 29-30, L. tr. $5\frac{1}{2}$-6/6.

Length of head 5 to $5\frac{1}{4}$, of caudal 4 to $4\frac{1}{2}$, height of body $3\frac{1}{4}$ to $3\frac{1}{2}$ in the total length. *Eyes*—diameter $3\frac{1}{2}$ in the length of the head, nearly to, or quite 1 diameter from the end of snout, and $1\frac{1}{4}$ to $1\frac{2}{3}$ apart. Body compressed. Dorsal and abdominal profiles about equally convex. Snout rather obtuse. Interorbital space a little convex. Lower labial fold interrupted. *Barbels*—the maxillary pair are one half longer than the orbit, the rostral pair a little shorter. *Fins*—dorsal commences midway between the end of the snout and the base of the caudal fin, it is slightly in advance of the insertion of the ventral, 2/3 as high as the body, having its upper edge concave, its last undivided ray osseous (weak in the young, but strengthening with age), as long as the head excluding the snout, and posteriorly serrated. *Lateral-line*—complete, $3\frac{1}{2}$ or 4 rows of scales between it and the base of the ventral fin: 10 rows before the dorsal fin. Free portion of the tail as high as long. *Colours*—silvery along the back and upper half of the body, becoming white shot with gold beneath: most of the scales with black bases. A dark band behind the opercles and a black blotch on the lateral-line, commencing about the twenty-fourth scale. Opercles and fins orange, caudal with a black superior and inferior edge.

B. gibbosus, Cuv. and Val. xvi, p. 155, from Allepey, may be this species, described from a specimen with a short head (6 in the total length). I have obtained similar starved or unhealthy examples.

Habitat.—From fresh waters at Coconada down the East coast of India to Ceylon, and inland as far as the Neilgherries, also along the Western ghauts and rivers at their bases. The largest example obtained was $10\frac{1}{2}$ inches in length. This form and *B. chrysopoma* may be merely varieties of a single species, whilst *B. sarana* is closely allied. The example figured (life-size) was from the Wynaad.

6. Barbus pleurotænia.

Puntius (Barbodes) pleurotænia, Bleeker, Cobit. et Cypr. Ceylon, in Nat. Verh. Holl. Maatsch. Harl. 1864, p. 13, t. 8, f. 2.
Barbus pleurotænia, Günther, Catal. vii, p. 120.

B. iii, D. 11 ($\frac{3}{8}$), P. 14, V. 9, A. 8 ($\frac{3}{5}$), C. 19, L. l. 27-29, L. tr. $5/4\frac{1}{2}$.

Length of head about $5\frac{1}{4}$, of caudal 5, height of body 4 in the total length. *Eyes*—diameter 2/7 of length of head, 1 to $1\frac{1}{4}$ diameters from end of snout, and slightly more apart. Body compressed, a little elevated; upper jaw slightly the longer. Lower labial fold interrupted. *Barbels*—both pairs somewhat longer than the orbit. *Fins*—dorsal commences over the ventral, and midway between the end of the snout and the base of the caudal: its last undivided ray is osseous, very strong, serrated posteriorly, and as long as the head, the upper margin of the fin concave: caudal forked. *Lateral-line*—complete, $2\frac{1}{2}$ rows of scales between it and the root of the ventral: 10 rows before the dorsal fin. *Colours*—a black band extends from the eye to the termination of the central caudal rays.

Habitat.—Ceylon.

7. Barbus goniosoma, Plate CXXXVII, fig. 2.

Puntius (Barbodes) goniosoma, Bleeker, Prod. Cyp. p. 349, and Atl. Ich. Cyp. p. 105, t. 31, f. 1.
Barbus goniosoma. Günther, Catal. vii, pp. 124.

B. iii, D. 11 ($\frac{3}{8}$), P. 15, V. 8, A. 7 ($\frac{2}{5}$), C. 19, L. l. 24, L. tr. $4\frac{1}{2}/4\frac{1}{2}$.

Length of head about 5, of caudal $5\frac{1}{2}$, height of body $3\frac{1}{4}$ in the total length. *Eyes*—diameter 2/7 of length of head, 1 diameter from end of snout, and $1\frac{1}{4}$ apart. Body elevated to the base of dorsal fin, whilst it is strongly compressed. Rostral barbels extend to below the middle of the eye: the maxillary ones to opposite the posterior margin of the orbit. *Fins*—origin of dorsal slightly posterior to the insertion of the ventrals, and midway between the anterior margin of the orbit and the base of the caudal: its spine is osseous, strong, as long as the head without the snout, and finely serrated posteriorly in its whole extent: the fin is 1/2 as high as the body. Caudal forked, the lower lobe the longer. *Lateral-line*—$2\frac{1}{2}$ rows of scales between it and the base of the ventral fin: 9 rows before the dorsal. Free portion of the tail rather higher than long. *Colours*—silvery, fins orange.

Habitat.—Mergui to Sumatra. I have obtained specimens at the first place up to 6 inches in length.

8. Barbus roseipinnis.

Cuv. and Val. xvi, p. 169; Bleeker, Beng. p. 60; Jerdon, M. J. L. and Sc. 1849, p. 314.

B. iii, D. 11 ($\frac{3}{8}$), A. 7 ($\frac{2}{5}$), C. 20, L. l. 22.

Dorsal profile elevated. *Eyes*—large. *Barbels*—four, thin and long. *Fins*—dorsal with its last undivided ray osseous, of moderate length and serrated. *Colours*—silvery: ventral, anal and caudal fins reddish, the lower border of the last tinged with black.

Habitat.—Pondicherry, from whence M. Belanger brought specimens $4\frac{1}{2}$ inches in length, which unfortunately had been mislaid when I was last in Paris.

b. Last undivided dorsal ray, osseous and entire.

9. Barbus dubius, Plate CXXXVII, fig. 1.

Puntius (Barbodes) dubius, Day, Proc. Zool. Soc. 1867, p. 291.
Barbus dubius, Günther, Catal. vii, p. 127.
Collec-aringean candee, Tam.

B. iii, D. 12 ($\frac{4}{9}$), P. 17, V. 9, A. 7 ($\frac{2}{5}$), L. l. 42-45, L. tr. 9/8.

Length of head $5\frac{1}{4}$, of caudal $4\frac{1}{2}$, height of body $4\frac{1}{2}$ in the total length. *Eyes*—diameter $4\frac{1}{2}$ in length of head, $1\frac{1}{3}$ diameters apart, and also from end of snout. Dorsal profile rather more convex than that of the abdomen. *Barbels*—rather short, the rostral pair being about equal to half the diameter of the orbit: whilst the maxillary are a little longer. Snout somewhat elevated. *Fins*—dorsal spine osseous, smooth, and strong, it is nearly as long as the head, the fin commences somewhat nearer to the end of the snout than the base of the caudal, and a little in advance of the insertion of the ventral. *Lateral-line*—complete, $4\frac{1}{2}$ to 5 rows of scales between it and the base of the ventral fins: 14 rows before the dorsal fin. *Colours*—uniform silvery, with the bases of the scales darkest.

Habitat.—Bowany river at the foot of the Neilgherries. The example figured was 10 inches in length.

10. **Barbus micropogon**, Plate CXXXVI, fig. 3, and CXXXVIII, fig. 4.

Cuv. and Val. xvi, p. 188; Bleeker, Beng. p. 60; (Günther, Catal. vii, p. 126, not synonymous).
Barbus gracilis, Jerdon, M. J. L. and Sc. 1849, p. 313 (not Schleg.).
Barbus Mysorensis, Jerdon, l. c.
Puntius gracilis, Day, Proc. Zool. Soc. 1867, p. 290, and 1870, p. 290.
Barbus conirostris, Günther, Catal. vii, p. 127.
Coatee candee, Tamil.

B. iii, D. 13 ($\frac{4}{9}$), P. 17, V. 10, A. 7-8 ($\frac{2-3}{5}$), C. 19, L. l. 39-41, L. tr. 6-7/7.

Length of head $4\frac{3}{4}$ to $5\frac{1}{2}$, of caudal 5, height of body 4 to $4\frac{1}{2}$ in the total length. *Eyes*—in the middle of the length of the head, diameter $3\frac{1}{2}$ to $4\frac{1}{2}$ in length of head, $1\frac{1}{4}$ diameters apart and also from end of snout. Interorbital space flat. Dorsal profile elevated. Snout conically pointed, and adults have pores on the preorbital, and even all across the snout. Cleft of mouth extending about half the distance to below the anterior margin of the orbit: upper jaw slightly the longer. Lower labial fold interrupted. *Barbels*—the rostral extend to below the anterior third of the orbit, the maxillary ones to below its posterior margin. *Teeth*—pharyngeal, crooked, pointed, 4, 3, 2/2, 3, 4. *Fins*—dorsal commences slightly before the insertion of the ventrals, and midway between the end of the snout and the base of the caudal fin: its osseous ray is strong, smooth, and somewhat compressed: its stiff portion being slightly longer than the head. Pectoral 3/4 as long as the head. Caudal deeply forked. *Lateral-line*—complete, but becomes lost in old specimens: 3 to $3\frac{1}{2}$ rows of scales between it and the ventral fin: 15 rows anterior to the dorsal fin. Free portion of the tail as high as long. *Colours*—cheeks golden, body with a greenish tinge superiorly, becoming white tinged with gold below the lateral-line, the base of each scale somewhat the darkest. Fins darkest along their centres.

Cuv. and Val. type (3 inches in length) is still in a good state of preservation at Paris.

The variety *B. Mysorensis*, Jerdon, has numerous large pores on the snout and preorbital.

Habitat.—Rivers around the base of the Neilgherries, and Wynaad and South Canara range of hills, also Mysore. It attains a large size, some were personally introduced into the Ootacamund lake. The example figured on plate cxxxvi (7·5 inches in length) was from the Wynaad: the specimen on plate cxxxviii (life-size) was from the Bowany.

11. **Barbus chilinoides**, Plate CXXXIX, fig. 5.

McClelland, Ind. Cyp. pp. 271, 340, pl. 57, f. 5; Bleeker, Beng. p. 60; Günther, Catal. vii, p. 127.
Barbus chelynoides, Cuv. and Val. xvi, p. 201.
Labeobarbus mosal, Steind. Sitz. Ak. Wiss. Wien, lvi, t. 3, and l. c. lxi, p. 364 (not *Cyprinus mosal*, H.B.).
Barbus micropogon, Günther, Catal. vii, p. 126 (not Cuv. and Val.).
Barbus Himalayanus, Day, Journal As. Soc. of Beng. xli, pt. ii, 1872, p. 525.
Chit-rah-too, Punj.

B. iii, D. 10-11 ($\frac{3}{7-8}$), P. 17, V. 9, A. 7 ($\frac{2}{5}$), C. 19, L. l. 32-35, L. tr. $5\frac{1}{2}$/6.

Length of head 5, of caudal 6, height of body $5\frac{1}{2}$ in the total length. *Eyes*—diameter 4 to 5 in the length of head, $1\frac{1}{4}$ diameters from end of snout, and two diameters apart. Body elongated, dorsal and abdominal profiles about equally convex. Mouth directed forwards, with the upper jaw slightly the longer: the snout overhangs the mouth. Some examples have a depression across the snout. There are numerous fine glands over the cheeks and opercles: lips moderately thick, the lower without a lobe, but with a continuous transverse fold. *Barbels*—the rostral and maxillary pairs of about the same length, and equal $1\frac{1}{2}$ diameters of the orbit. *Fins*—dorsal commences about midway between end of snout and base of the caudal fin, its last undivided ray is osseous, very strong, entire, its stiff portion being about three-fifths of the length of the head. Anal laid flat reaches the base of the caudal, which is deeply forked. *Lateral-line*—complete, there are three rows of scales between it and the base of the caudal fin. *Colours*—golden above, becoming silvery beneath, the margins of the scales with numerous fine black dots: a black mark behind the opercle. Fins reddish.

The specimen of *B. micropogon*, Günther (not C.V.), in the British Museum, 30 inches long, is a very badly stuffed skin, only one side has been preserved. It has evidently been stretched.

Habitat.—Himalayas, as far to the east as Assam, it is also found in the Ganges. It attains $2\frac{1}{2}$ feet in length. The example figured (life-size) was from near Simla.

12. **Barbus Carnaticus**, Plate CXXXVII, fig. 3.

Jerdon, M. J. L. S. 1849, p. 311: Günther, Catal. vii, p. 128.
Puntius (Barbodes) Carnaticus, Day, Proc. Zool. Soc. 1867, p. 292.
Poaree candee, Saal candee, Shellee, Tamil.: *Giddi-kaoli*, Hind.: *Gid-pakke*, Can.

B. iii, D. 12($\frac{4}{8}$), P. 15, V. 9, A. 7($\frac{2}{5}$), C. 19, L. l. 32, L. tr. 5/6.

Length of head $5\frac{3}{4}$, of caudal $4\frac{1}{2}$ to 5, height of body 3 to 4 in the total length. *Eyes*—diameter 3 to 4 in the length of the head, 1 diameter from the end of snout, and $1\frac{1}{2}$ to 2 apart. Interorbital space flat. Dorsal profile more convex than that of the abdomen. Upper jaw the longer. Lower labial fold interrupted. *Teeth*—

pharyngeal, pointed, curved, 5, 3, 2/2, 3, 5. *Barbels*—thin, both pairs shorter than the eye. *Fins*—the dorsal 3/4 as high as the body with a concave upper edge: it commences anterior to the insertion of the ventral, and midway between the snout and the base of the caudal fin, its last undivided ray is a strong, broad, smooth spine, nearly as long as the head in the immature, and sometimes longer in the adult, especially in specimens from Canara. Pectoral as long or rather longer than the head. Anal laid flat reaches the caudal. *Lateral-line*—complete, $3\frac{1}{2}$ rows of scales between it and the base of the ventral fin: 12 rows anterior to the dorsal fin. Free portion of the tail as high at its base as it is long. *Colours*—greenish-brown along the back, becoming dull white glossed with gold on the sides and beneath. Fins grayish. Eyes golden.

Habitat.—Rivers along the bases of the Neilgherries, Wynaad, and South Canara hills. It attains at least 25 lbs. in weight. Some have been introduced into the Ootacamund lake. The figure is from a young specimen, life size, the dorsal spine not being well-developed, and the snout not so obtuse as in older specimens.

13. Barbus hexagonolepis, Plate CXXXVII, fig 4.

McClelland, Ind. Cyp. pp. 270, 336, pl. 41, f. 3.

Bokar and *Boolooah*, Assam.

B. iii, D. 12($\frac{3}{9}$), P. 17, V. 9, A. 7($\frac{2}{5}$), C. 19, L. l. 28-31, L. tr. $4\frac{1}{2}/4\frac{1}{2}$.

Length of head 5 to $5\frac{1}{2}$, of caudal 5 to $5\frac{1}{2}$, height of body 5 to $5\frac{1}{2}$ in the total length. *Eyes*—diameter 5 to 6 in the length of the head, $1\frac{1}{2}$ to 2 diameters from the end of the snout, and $2\frac{1}{2}$ apart. Dorsal and abdominal profiles equally and slightly convex. Interorbital space rather convex. Upper jaw the longer. Lower labial fold interrupted. Opercle higher than wide. Sometimes pores on the cheeks. *Barbels*—the maxillary reach nearly to below the hind edge of the preopercle, the rostral ones are shorter. *Fins*—dorsal 2/3 as high as the body, it commences somewhat anterior to the insertion of the ventral, and about midway between the end of the snout and the base of the caudal fin, its last undivided ray is strong, osseous, smooth, with its stiff portion as long as the head excluding the snout. Pectoral as long as the head excluding the snout, and not reaching the ventral. Anal laid flat does not extend to the base of the caudal which is deeply forked. *Lateral-line*—complete, 2 to $2\frac{1}{2}$ rows of scales between it and the ventral: 10 to 11 rows before the dorsal. Exposed portion of scales somewhat hexagonal. Free portion of tail rather longer than high. *Colours*—deep bluish-gray, fins darker.

The character of the interrupted groove behind the lower lip at once distinguishes this species from *B. hexastichus.*

Habitat.—Assam in the larger rivers, and those from the Himalayas. It attains upwards of 2 feet in length, and takes a fly or bait freely. The specimen figured (9 inches in length) was from Suddya. McClelland considered *Cyprinus putitora*, Ham. Buch. as a variety of this species, it is said to attain 9 feet in length.

14. Barbus Dukai, Plate CXLIII, fig. 3.

B. iii, D. 13($\frac{4}{9}$), P. 15, V. 9, A. 7($\frac{2}{5}$), C. 19, L. l. 28-29, L. tr. 4/4.

Length of head $4\frac{3}{4}$ to 5, of caudal $4\frac{3}{4}$ to 5, height of body $4\frac{1}{3}$ to 5 in the total length. *Eyes*—diameter $3\frac{2}{3}$ to 4 in the length of the head, $1\frac{1}{4}$ diameters from the end of snout, and $1\frac{1}{3}$ apart. Body elongated and compressed. Interorbital space rather convex. Sides of snout and below the eye with large open tubercles. The maxilla reaches to beneath the commencement of the orbit. Lower labial fold interrupted. *Barbels*—the rostral pair are slightly longer than the orbit, the maxillary pair almost reach the angle of the preopercle. *Fins*—the dorsal commences rather nearer the snout than the base of the caudal fin, and a little in advance of the insertion of the ventral, its last undivided ray is strong, osseous, with its stiff portion as long as the head excluding the snout, the fin is 3/4 as high as the body below it, having its upper edge very concave. *Lateral-line*—complete, $2\frac{1}{2}$ rows between it and the base of the ventral fin: 9 rows before the dorsal fin. The scales covered with numerous horizontal striæ. Free portion of the tail rather longer than high. *Colours*—of a leaden tinge along the upper portion of the body, becoming dull white shot with gold on the sides and beneath, edges of scales darkest. Fins yellow, with a dark band having a lighter outer edge along the upper and lower edge of the caudal fin.

Habitat.—Teesta river Darjeeling, from whence Dr. Duka sent me several examples, and after whom I have named it. The specimen figured (life-size) is the largest: its having pores on the side of the mouth would seem to denote that it is not the fry of some larger species.

15. Barbus tor, Plate CXXXVI, fig. 5; and CXL, fig. 1.*

Cyprinus, tor, mosal and *putitora?* Ham. Buch. Fish. Gang. pp. 303, 306, 388; Gray and Hard. Ind. Zool.; McClelland, Ind. Cyp. pp. 271, 303, 337, 388, pl. xli, f. 3; Cuv. and Val. xvi, p. 197; Jerdon, M. J. L. and S. 1849, p. 311.

Labeobarbus macrolepis, Heckel, Fische aus Kashmir, p. 60, t. x. f. 2; Bleeker, Beng. p. 60.

Barbus progeneius and *megalepis*, McClelland, Ind. Cyp. pp. 270, 271, 334, 337; Jerdon, M. J. L. and Sc. 1849, p. 311.

* For an account of the natural history of the Mahaseer, and the sport it affords, see "The Rod in India," by H. S. Thomas, Mangalore, 1873.

Barbus macrocephalus, McClell. Ind. Cyp. pp. 270, 335, pl. 55, f. 2; Cuv. and Val. xvi, p. 201; Bleeker, Beng. p. 60; Günther, Cat. vii, p. 131; Day, Proc. Z. S. 1869, p. 556.

Barbus mosal, Cuv. and Val. xvi, p. 200; Bleeker, Beng. p. 60; Day, Proc. Z. S. 1870, p. 372.

Barbus mussulah, Sykes, Trans. Zool. Soc. ii, p. 356; Bleeker, Beng. p. 60; Jerdon, M. J. L. and Sc. 1849, p. 313.

Barbus Hamiltonii, Jerdon, M. J. L. and S. 1849, pp. 311, 312.

Labeobarbus, tor and *progenius*, Bleeker, Beng. p. 60, and Cobit. and Cyprin. Ceylon, 1864, p. 10, t. 2.

Barbus macrolepis, Günther, Catal. vii, p. 131.

Burapatra, Assam: *Poo-meen-candee*, Tam.: *Naharm*, Hind.: *Kukhiah*, Punj.: *Joon-gah*, *Petiah* and *Kurreah*, Sind.

B. iii, D. 12($\frac{3}{9}$), P. 19, V. 9, A. 7-8($\frac{2-3}{5}$), L. l. 25-27, L. tr. 4/4.

Length of head 4 to 5, of caudal $4\frac{3}{4}$ to 5, height of body $4\frac{1}{3}$ to $5\frac{1}{2}$ in the total length. *Eyes*—diameter $6\frac{1}{4}$ to $7\frac{1}{2}$ in the length of the head in moderately sized specimens but much larger in the young (at 3·5 inches in length being $3\frac{1}{2}$ in the length of the head; at 5 inches, $4\frac{1}{2}$), 2 to $2\frac{1}{4}$ diameters from the end of snout, and 2 apart. Interorbital space flat. Opercle 1/4 higher than wide: the maxilla reaches to below the front edge of the eye: snout pointed: jaws of about the same length: lips thick, with an uninterrupted fold across the lower jaw, and both the upper and lower lips in some specimens produced in the mesial line. Dorsal profile more convex than the abdominal in some examples, not so in others. *Barbels*—the maxillary pair longer than the rostral ones, and extend to below the last third of the eye. *Fins*—the dorsal arises opposite the ventral and is 3/4 as high as the body, its last undivided ray is smooth, osseous, strong, and of varying length and thickness. Himalayan, Bengal, and Central Indian specimens generally have the spine strong, and from 1/2 to 2/3 the length of the head, it rarely exceeding this extent. In Canara, Malabar, and Southern India, where the lips are largely developed (see Pl. CXL.) the spine is very much stronger and as long as the head excluding the snout. Pectoral as long as the head excluding the snout, it reaches the ventral which is little shorter. Anal laid flat does not reach the base of the caudal which is deeply forked. *Lateral-line*—complete, 2 to $2\frac{1}{2}$ rows of scales between it and the base of the ventral fin: 9 rows before the dorsal. Free portion of the tail longer than high. *Colours*—silvery or greenish along the upper half of the body, becoming silvery shot with gold on the sides and beneath. Lower fins reddish yellow.

This fish is the celebrated "Maha seer" of sportsmen in India. The various large barbels in Assam are termed "*Petiah*," with a specific name prefixed to denote the species alluded to.

Barbus macrocephalus, McClelland, from along the Eastern Himalayas and Upper Assam, has not the length of the head, "2/5 only of the total (without the caudal)"—(Günther); but *without the head or caudal*, or 2/7 of the total excluding the caudal fin. It has rather a longer head ($4\frac{1}{4}$ in the total) than is usual, its eye is nearer the front end of the head, whilst the upper bone of the suborbital ring is very wide.

Barbus tor, H. B., or *progenius*, McClell., shows great variation in the length of the head which seems to augment in proportion with the size of the fish: the body is often much higher, whilst the lips are very much more developed than in the last variety.

Habitat.—Generally throughout India, but in the largest size, and greatest abundance in mountain streams or those which are rocky.

16. Barbus hexastichus, Plate CXXXVI, fig. 4.

Barbus hexastichus, McClelland, Ind. Cyp. pp. 269, 333, pl. 39, f. 2; Günther, Catal. vii, p. 129.

? Labeobarbus tor, Bleeker, Ceylon, 1864, p. 10, t. 2 (not Ham. Buch.)

? Barbus longispinis, Günther, Catal. vii, p. 132.

Lobura, Assam.

B. iii, D. 12-13($\frac{3-4}{9}$), P. 17, V. 9, A. 7($\frac{2}{5}$), C. 19, L. l. 25-26, L. tr. 4/5.

Length of head 5 to 6, of caudal 5 to $5\frac{1}{2}$, height of body $4\frac{1}{2}$ to 5 in the total length. *Eyes*—diameter 1/5 of length of head, $1\frac{1}{2}$ diameters from end of snout, 2 diameters apart. Interorbital space slightly convex. Opercle higher than wide. Lips moderately thick, the lower one without or with a badly developed lobe, but having a shallow and continuous transverse fold. Mouth rather inferior, directed anteriorly: the upper jaw slightly the longer. Sometimes pores on the cheeks. *Barbels*—longer than the eye. *Fins*—dorsal fin with its osseous ray strong, smooth, and from half as long as head to as long as the head without the snout, it commences somewhat nearer the snout than the base of the caudal, the latter being deeply forked, with the lower lobe the longer. Pectoral as long as the head excluding the snout. *Lateral-line*—complete, 2 to $2\frac{1}{2}$ rows of scales between it and the base of the ventral fin: 10 rows before the dorsal fin. Free portion of the tail longer than high. *Colours*—brownish, tinged with green along the upper edge of the body, becoming dull white shot with yellow on the sides and below: caudal and anal reddish. The fry have a black spot before the base of the caudal fin.

Habitat.—Rivers on and around Himalayas, Cashmere, Sikhim and Assam, growing to 3 feet in length. The example figured is 10·5 inches long and from Assam. Specimens from the plains appear to have the head

comparatively longer than those from the hills. Ceylon examples, which seem to be a variety, have a longer dorsal spine it being equal to or a little longer than the head.

17. Barbus Bovanicus, Plate CXXXVIII. fig. 1.

B. iii, D. $12(\frac{3}{9})$, P. 17, V. 9, A. $8(\frac{3}{5})$, C. 19, L. l. 24-26. L. tr. $4\frac{1}{2}/4\frac{1}{2}$.

Length of head $4\frac{2}{3}$, of caudal $4\frac{1}{2}$, height of body $3\frac{2}{3}$ in the total length. *Eyes*—diameter $3\frac{2}{3}$ in the length of the head, 1 to $1\frac{1}{4}$ diameters from the end of snout, and $1\frac{2}{3}$ apart. Dorsal profile somewhat more convex than that of the abdomen. Interorbital space flat. Snout somewhat obtuse. Upper jaw the longer. Lower labial fold in the adult complete, with a moderately developed median lobe, but such is not apparent in the young. *Barbels*—rostral pair extend to beneath first 1/3 of the eye, the maxillary pair to the posterior edge of the preopercle. *Fins*—dorsal 2/3 as high as the body, with a concave upper edge, it commences anterior to the ventrals and midway between the end of snout and the base of the caudal fin: its last undivided ray is osseous, of moderate strength, its stiff portion being as long as the head excluding the snout. Pectoral as long as the head posterior to the nostrils and longer than the ventral. Anal laid flat reaches the caudal. Free portion of the tail as long as high. *Lateral-line*—complete, $2\frac{1}{2}$ rows of scales between it and the base of the ventral fin: 10 rows before the dorsal fin. *Colours*—greenish, with a golden tinge, darkest along the back.

Habitat.—Bowany river at base of Neilgherry hills in Madras. The largest specimen obtained 5 inches in length.

18. Barbus sophore, Plate CXLIII, fig. 4.

Cyprinus sophore, Ham. Buch. Fish. Ganges, pp. 310, 389, (part) and (pl. 19, f. 86 not synonymons).
Barbus sophore, Day, Proc. Zool. Soc. 1869, p. 376 (not Günther).

B. iii, D. 12 $(\frac{3}{9})$, P. 15, V. 9, A. 7 $(\frac{2}{5})$, L. l. 25, L. tr. $3\frac{1}{2}/4\frac{1}{2}$.

Length of head $4\frac{1}{2}$, of caudal $4\frac{1}{2}$, height of body $3\frac{1}{2}$ in the total length. *Eyes*—3 to $3\frac{1}{4}$ in the length of the head, nearly 1 diameter from end of snout, and also apart. Cleft of mouth extending to below the first third of the orbit. Upper jaw the longer. Lower labial fold interrupted. *Barbels*—long and thin, the maxillary pair 1/2 longer than the eye: the rostral pair slightly shorter. *Fins*—dorsal ray weak, osseous, entire, and as long as the head without the snout: the fin arises slightly before the ventral, and midway between the end of the snout and the root of the caudal. *Lateral-line*—complete, $2\frac{1}{2}$ rows between it and the base of the ventral: 9 rows before the dorsal fin. *Scales*—with numerous longitudinal striæ. *Colours*—silvery, with a lateral blotch.

Systomus sophore, McClelland, is the same as *Barbus stigma*, C. V.

That *Barbus stigma* destitute of barbels, has been generally considered identical with *B. sophore*, H. B. does not admit a doubt; it also agrees with H. B.'s figure in which no barbels are shown. But in the text he observes "there are four *tendrils*, so very minute as often to be scarcely perceptible." When examining the collection of fishes of the Asiatic Society of Bengal, in the Calcutta Museum, I came across an old bleached specimen without any label to say from whence it had been received, it was $3\frac{1}{2}$ inches long to the base of the caudal fin, the latter being injured from pressure. Since then about 12 more specimens have been received from the Khasia hills, thus ascertaining its habitat. Buchanan appears to have mixed up two species—the geographical distribution and figure give *B. stigma*, as is also evident from the markings on the scale; the text *B. sophore* which has 4 barbels.

Habitat.—Assam and Khasia hills.

19. Barbus Stracheyi, Plate CXXXIX, fig. 4.

Barbus Malabaricus, Day, Proc. Zool. Soc. 1869, p. 619, (not Jerdon).
Barbus (barbodes) Stracheyi, Day, J. A. S. of B. 1871, p. 307.

B. iii, D. $11(\frac{2}{9})$, P. 17, V. 9, A. $7(\frac{2}{5})$, C. 17, L. l. 23, L. tr. $3\frac{1}{2}/5$.

Length of head $4\frac{1}{2}$, of caudal 6, height of body $4\frac{1}{2}$ in the total length. *Eyes*—diameter 5 in the length of head, $1\frac{1}{2}$ diameters from end of snout, $2\frac{1}{2}$ diameters apart. Mouth without enlarged lips: lower labial fold interrupted. Upper jaw somewhat the longer. Summit of head flat. *Barbels*—long, the rostral pair reaching to below the centre of the orbit, and the maxillary pair to beneath its posterior margin. *Fins*—dorsal osseous ray strong, smooth, and as long as the head without the snout, it commences midway between the end of the snout and the base of the caudal fin. *Lateral-line*—complete, $2\frac{1}{2}$ rows of scales between it and the base of the ventral fins. *Colours*—uniform silvery.

Habitat.—Akyab and Moulmein.

I have named this species after General Strachey, C.B., F.R.S., who I have to thank for assistance in enabling me to prosecute my enquiries into the fish and fisheries of India.

c. *Last undivided dorsal ray articulated, or if osseous very weak.*

20. Barbus curmuca, Plate CXLI, fig. 1.

Cyprinus curmuca, Buchanan's Journey in Mysore, iii, p. 344, pl. xxx, and Fishes of Ganges, pp. 294, 387; McClelland, Ind. Cyp. pp. 276, 353.

Gobio curmuca, Cuv. and Val. xvi, p. 317.
Gobio curmuca and *Canarensis*, Jerdon, M. J. L. and Sc. 1849, p. 306.
Barbus curmuca, Day,* P. Z. S. 1873, p. 707.

B. iii, D. 12 ($\frac{3}{9}$), P. 16, V. 9, A. 8 ($\frac{3}{5}$), C. 18, L. l. 41, L. tr. 8/7.

Length of head 5, of caudal $4\frac{1}{3}$, height of body 5 in the total length. *Eyes*—diameter $4\frac{1}{3}$ in the length of the head, $1\frac{1}{2}$ diameters from the end of the snout, and also apart. Snout conical, head compressed, interorbital space transversely concave. Dorsal profile more convex than that of the abdomen. In adults a band of open pores goes from the preorbital along the cheek. *Barbels*—two maxillary pairs, the lower as long as the eye, the upper 1/2 as long. *Fins*—dorsal as high as the body, its upper edge concave, it arises anterior to the insertion of the ventral, and rather nearer the snout than to the base of the caudal fin, its last undivided ray weak and articulated. *Lateral-line*—complete, $3\frac{1}{2}$ rows between it and the base of the ventral fin: 15 rows anterior to the dorsal fin. Caudal deeply forked, its lobes pointed. Free portion of the tail as long as high. *Colours*—silvery, lightest on the sides and beneath: tips of the caudal blackish. In the young, the middle third of the caudal is orange, and it is tipped with black.

Habitat.—Western ghauts of India, attaining to at least 4 feet in length. Jerdon obtained it from Palghaut and Arriacode in South Malabar.

21. Barbus lithopidos, Plate CXXXVIII, fig. 2.

Day, Proceedings Zoological Society, 1873, p. 708.
Kuri meen, Canarese.

B. iii, D. 12 ($\frac{3}{9}$), P. 15, V. 10, A. 8 ($\frac{3}{5}$), C. 19, L. l. 38-39, L. tr. 7/7.

Length of head $5\frac{3}{4}$ to $6\frac{1}{3}$, of caudal 4, height of body $4\frac{3}{4}$ in the total length. *Eyes*—$3\frac{3}{4}$ to $4\frac{1}{4}$ diameters in length of head, 1 to $1\frac{1}{2}$ diameters from end of snout, and $1\frac{1}{3}$ apart. Body compressed, dorsal and abdominal profiles equally and moderately convex. Interorbital space somewhat convex. Upper jaw slightly the longer: lower labial fold interrupted: a thin cartilaginous covering internally to either jaw. Large examples have pores on the preorbital. *Barbels*—both pairs thin, and about as long as the orbit. *Fins*—dorsal high in front, equalling the height of the body, its upper edge concave, the origin of the fin is anterior to the insertion of the ventral, and midway between the end of the snout and the base of the caudal fin, its last undivided ray weak and articulated. Pectoral and ventral of equal length, and as long as the head. Caudal very deeply forked. *Lateral-line*—complete, 4 rows of scales between it and base of ventral fin: 14 rows before the dorsal. Free portion of the tail as high at its base as it is long. *Colours*—slaty, as are the fins, having their outer rays whitish. Pectoral yellowish, tail greenish. Adults are more yellow, with a gray band behind the opercle, and some of the scales scarlet.

Habitat.—South Canara, where it is not uncommon in the rivers, and attains 2 feet in length. The specimen figured is 7·4 inches long.

22. Barbus Thomassi, Plate CXXXVII, fig. 5.

Day, Proceedings Zool. Soc. 1873, p. 707.
Kem-pu-per-ru-wul, Canarese (Red Mahaseer).

B. iii, D. 12-13 ($\frac{3-4}{9}$), P. 17, V. 10, A. 8 ($\frac{3}{5}$), C. 19, L. l. 31-34, L. tr. 6/6.

Length of head $5\frac{3}{4}$ to $6\frac{1}{4}$, of caudal $3\frac{3}{4}$ to $4\frac{1}{3}$, height of body 4 to $4\frac{1}{2}$ in the total length. *Eyes*—high up, diameter $3\frac{3}{4}$ to 4 in the length of head, $1\frac{1}{2}$ diameters from the end of snout, and also apart. Dorsal profile about equally convex with that of the abdomen. Interorbital space slightly convex. Snout rather pointed: upper jaw the longer: lower labial fold interrupted. Height of head equals its length excluding the snout. *Barbels*—thin, the maxillary not so long as the eye, the rostral pair shorter. *Fins*—dorsal high anteriorly, equalling the height of the body, its origin is anterior to the insertion of the ventral, and midway between the end of the snout and the base of the caudal fin: its upper edge very concave, and its last undivided ray weak and articulated. Pectoral and ventral of equal length, and 4/5 as long as the head: caudal deeply forked, the upper lobe the longer. *Lateral-line*—complete, $2\frac{1}{2}$ rows of scales between it and the base of the ventral fin: 12 rows anterior to the dorsal. Free portion of the tail as high at its base as it is long. *Colours*—silvery along the back, each scale with a red lunule: dorsal and caudal fins of a lake colour, the last being usually edged with black. Ventral and anal also lake colour, stained with grayish-black. Most of the scales with a dark base.

Habitat.—South Canara, attaining at least $3\frac{1}{2}$ feet in length. I have named the species after Mr. H. S. Thomas, M.C.S., who first brought the fish to my notice. The specimen figured is 9·5 inches in length.

23. Barbus spinulosus.

McClelland, Cal. Journ. Nat. Hist. p. 280, pl. 21, f. 3; Bleeker, Beng. p. 60; Günther, Catal. vii, p. 128.

* Since the above was in type, Captain Beavan's "Fresh-water Fishes of India," with the list of species revised by Dr. Günther, has come under my notice. It is suggested that *Barbus curmuca* (H. B.) Day, from Malabar, may be a local variety of *Barbus curmuca*, Beavan and Günther. The figure of their fish is given, and represents *B. kolus*, not *B. curmuca*. The example seems to have come from the Central Provinces where *B. kolus* exists, but *B. curmuca* is not found.

B. iii, D. 12 ($\frac{3}{9}$), P. 15, V. 9, A. 10 ($\frac{3}{7}$), C. 19, L. l. 32.

Length of head 5, height of body $4\frac{1}{2}$ in the total length. Back a little elevated. *Eyes*—before the middle of the length of the head. Dorsal profile but slightly arched. Snout short. *Fins*—dorsal without osseous ray, commencing midway between the end of the snout and the base of the caudal. *Colours*—greenish above, white below: fins pale.

McClelland observes "length of the head is equal to a fourth part of the length of the body," or 5 in the total excluding the caudal fin: but in the figure it is shown as $4\frac{1}{3}$.

Habitat.—Sikhim, from whence a single specimen, 7 inches long, was obtained by McClelland.

24. **Barbus pulchellus,** Plate CL, fig. 3.

Day, Proc. Zool. Soc. 1870, p. 372.
Katladi, Canarese, Tulu, Mal.

B. iii, D. 12 ($\frac{3}{9}$), P. 17, V. 9, A. 7 ($\frac{2}{5}$), C. 19, L. l. 30-32, L. tr. 5-6/$5\frac{1}{2}$.

Length of head 6 to $6\frac{1}{2}$, of caudal $4\frac{1}{2}$ to 5, height of body 4 to $4\frac{1}{2}$ in the total length. *Eyes*—diameter $3\frac{1}{2}$ in length of head, $1\frac{1}{4}$ diameters from the end of the snout, and $1\frac{3}{4}$ apart. There is a very gradual rise from the snout to the base of the dorsal fin. Interorbital space nearly flat. Pores on the snout. *Barbels*—four, the maxillary pair being the longest, equalling one-third of the length of the head. *Teeth*—pharyngeal, crooked, pointed, 4, 3, 2/2, 3, 4. *Fins*—dorsal arises slightly anterior to the ventral and rather nearer to the snout than the base of the caudal fin, its upper border is concave, it is two-thirds the height of the body, having its last undivided ray weak, smooth, and articulated. Caudal deeply forked. *Scales*—$3\frac{1}{2}$ rows between the lateral-line and the base of the ventral fin. *Colours*—all the scales above a line going direct from the eye to centre of the caudal fin are of a deep gray, with dark bases; below or in the inferior half of the body all are silvery gray: fins with dark edges.

Habitat.—South Canara, frequenting the inland streams. Two specimens up to $17\frac{1}{2}$ inches long were given me by H. S. Thomas, Esq., Madras Civil Service. The figure is 1/3 the size of the example.

25. **Barbus Dobsoni,** Plate CXXXIX, fig. 6.

Day, Journal, Linnean Society, 1876, Zool. xii, p. 574.

B. iii, D. 12-13($\frac{3-4}{9}$), P. 14, V. 9, A. 8($\frac{3}{5}$), C. 19, L. l. 30-32, L. tr. $5\frac{1}{2}$-6/$5\frac{1}{2}$.

Length of head 6, of caudal $4\frac{1}{2}$, height of body $3\frac{1}{4}$ to $3\frac{1}{2}$ in the total length. *Eyes*—diameter $3\frac{1}{3}$ in the length of the head, nearly 1 diameter from end of snout, and $1\frac{1}{2}$ apart. Dorsal profile elevated. Snout a little obtuse. Interorbital space slightly concave. Mouth narrow. The upper jaw the longer. Lower labial fold interrupted. *Barbels*—thin, the maxillary ones as long as the eye, the rostral somewhat shorter. *Teeth*—pharyngeal, crooked and pointed 5, 3, 2/2, 3, 5. *Fins*—dorsal commences somewhat in advance of the insertion of the ventral, it is about 2/3 as high as the body, its last undivided ray articulated and smooth. Pectoral as long as the head. *Lateral-line*—complete, $3\frac{1}{2}$ rows of scales between it and the ventral fin: 12 rows anterior to the dorsal. Free portion of the tail nearly as high at its base as it is long. *Colours*—bluish above becoming lighter on the sides and beneath, fins edged with gray, upper corner of dorsal and ends of caudal blackish.

This fish is closely allied to *B. Jerdoni*, of which it may be a local variety.

Habitat.—Deccan from whence Dr. A. J. Dobson sent me specimens: I likewise obtained this species at Kurnool, in September, 1866, and also at Poona. The example figured is 7·5 inches in length.

26. **Barbus Jerdoni,** Plate CXXXVIII, fig. 5.

Day, Proc. Zool. Soc. 1870, p. 372.
Say-meen, Can.: *Cha-meen*, Tulu: *Ta-meen*, Mal.

B. iii, D. 12($\frac{3}{9}$), P. 15, V. 9, A. 8($\frac{3}{5}$), C. 19, L. l. 27-28, L. tr. 6/4.

Length of head 5 to $5\frac{1}{4}$, of caudal 4, height of body 4 in the total length. *Eyes*—diameter 3 to $3\frac{1}{2}$ in length of head, 1 to $1\frac{1}{2}$ diameters from end of snout, and $1\frac{1}{2}$ apart. Interorbital space nearly flat. The height of the head nearly equals its length. A considerable rise to the commencement of the dorsal fin. Body compressed. Mouth narrow: upper jaw the longer. Lower labial fold interrupted. *Barbels*—thin, the maxillary being as long as the orbit, the rostral slightly shorter. *Fins*—last undivided dorsal ray articulated, weak and not enlarged: the fin which is 4/5 as high as the body below it, commences midway between the snout and the base of the caudal. Pectoral as long as the head and nearly reaching the ventral which is of the same length. Anal laid flat reaches somewhat beyond the root of the caudal fin which is deeply forked. *Lateral-line*—complete, rather concave: $2\frac{1}{2}$ to $3\frac{1}{2}$ rows of scales between it and the base of the ventral: 12 rows before the dorsal fin. Free portion of the tail rather higher than long. *Colours*—silvery, fins which have an orange tint, tipped with black.

Habitat.—Rivers in Canara below the Ghauts, attaining 18 inches in length. The example is figured life-size.

27. **Barbus Wynaadensis,** Plate CXXXVIII, fig. 3 and CXXXIX, fig. 2.

Day, Journal Linn. Soc. 1873, Zool. xi, p. 528.

B. iii, D. 13($\frac{4}{9}$), P. 17, V. 9, A. 8($\frac{3}{5}$), C. 19, L. l. 26-28, L. tr. 4/6.

Length of head $4\frac{3}{4}$ to 5, of caudal 5 to $5\frac{1}{2}$, height of body $4\frac{1}{4}$ to 5 in the total length. *Eyes*—diameter 5 in the length of head, $1\frac{1}{2}$ to 2 diameters from the end of snout, and $1\frac{3}{4}$ apart. No considerable rise to the base of the dorsal fin. Snout conical. Upper jaw the longer overlapping the lower. Interorbital space nearly flat. Lower labial fold interrupted. *Barbels*—the maxillary pair as long or longer than the orbit, the rostral 1/4 shorter. *Fins*—the dorsal 2/3 as high as the body, its origin is a little anterior to the insertion of the ventral, its last undivided ray weak, osseous, with an articulated extremity. *Lateral-line*—complete, $2\frac{1}{2}$ to 3 rows of scales between it and the base of the ventral fin: 10 rows before the dorsal fin. Free portion of the tail rather longer than high. *Colours*—leaden silvery along the back, with a dark band running from behind the eye to the middle of the base of the caudal fin where it sometimes ends in a round black blotch. Abdomen of a light orange colour. Fins stained with gray at their edges.

Habitat.—Vithry in the Wynaad where it is common in the larger streams. It attains at least 8 inches in length. The examples are figured life-size.

28. Barbus Stevensonii, Plate CXXXV, fig. 6.

Day, Proc. Zool. Soc. 1870, p. 100.

B. iii, D. 12($\frac{3}{9}$), P. 17, V. 9, A. 8($\frac{3}{5}$), C. 19, L. l. 27, L. tr. $4\frac{1}{2}$/5.

Length of head $4\frac{1}{2}$, of caudal nearly 4, height of body $4\frac{1}{2}$ in the total length. *Eyes*—diameter 2/7 of length of head, 1 diameter from end of snout and apart. Body elongated and compressed: dorsal profile but little arched. Upper jaw the longer. Lower labial fold interrupted. *Barbels*—the maxillary extend to below the posterior extremity of the orbit, the rostral are shorter. *Fins*—dorsal with a smooth, weak, osseous ray, as long as the head excluding the snout: it is rather lower than the body, arising midway between the end of the snout and the base of the caudal, whilst it is slightly in advance of the ventrals. *Lateral-line*—complete, there are $2\frac{1}{2}$ rows of scales between it and the base of the ventral fin: and 9 before the dorsal fin. *Colours*—silvery, upper portion of the body the darker: numerous black specks along the side: a black spot at the base of the caudal, and a dark band along the dorsal fin.

Habitat.—Hills near Akyab. I named this species after the late Colonel Stevenson, Commissioner at Akyab, who procured for me several new sorts of fish from that locality. It is figured life-size.

29. Barbus Neilli, Plate CXL, fig. 4.

Day, Proceedings Zoological Society, 1868, p. 581.

? *Barbus khudree*, Sykes, Fishes of Deccan, p. 357; Bleeker, Beng. p. 60; Jerdon, Madr. J. L. and Sc. 1849, p. 313.

B. iii, D. 13($\frac{4}{9}$), P. 15, V. 10, A. 8($\frac{3}{5}$), C. 19, L. l. 24-26, L. tr. $4\frac{1}{2}$/4.

Length of head $4\frac{1}{2}$ to 5, of caudal 5, height of body $3\frac{1}{2}$ to 4 in the total length. *Eyes*—diameter $4\frac{1}{2}$ to 5 in the length of the head, $1\frac{1}{2}$ diameters from the end of snout and also apart. Dorsal and abdominal profiles about equally convex. Interorbital space nearly flat. Snout conical with the upper jaw slightly the longer. Lower labial fold continuous. *Barbels*—the rostral pair reach the front edge of the eye, the maxillary pair equal $1\frac{1}{2}$ diameters of the orbit. *Teeth*—pharyngeal, curved, 5, 3, 2/2, 3, 5. *Fins*—origin of dorsal rather nearer base of caudal fin than the end of the snout, and anterior to the insertion of the ventral, it is 2/3 as high as the body, its upper edge concave, its last undivided ray osseous, entire, and very weak. Pectoral as long as the head excluding the snout, and longer than the ventral. Anal laid flat reaches the base of the caudal which is forked. *Lateral-line*—complete, $3\frac{1}{2}$ rows of scales between it and the ventral fin: 9 rows anterior to the dorsal. Free portion of the tail as high as long. *Colours*—silvery above the lateral-line with a tinge of yellow below it. Fins with a bluish tinge in some specimens, reddish in others. The young have a dark spot at the base of the caudal fin. Eyes golden.

Habitat.—Kurnool on the Tamboodra river. The largest specimen personally seen was 38 lbs. weight, but it is said to attain to 50 or 60 lbs. The example figured is stuffed, and 22 inches in length.

30. Barbus Malabaricus, Plate CXXXVIII, fig. 6.

Jerdon, M. J. L. and Sc. 1849, p. 312.

B. iii, D. 12-13 ($\frac{3-4}{9}$), P. 17, V. 9, A. 8 ($\frac{3}{5}$), C. 19, L. l. 24, L. tr. 4/4.

Length of head $4\frac{2}{3}$ to 5, of caudal 5, height of body $4\frac{1}{2}$ to $4\frac{3}{4}$ in the total length. *Eyes*—diameter 5 in the length of head, $1\frac{2}{3}$ diameters from end of snout, and 2 apart. Dorsal and abdominal profiles about equally and moderately convex. Interorbital space slightly convex. Upper jaw the longer: lips thick: lower labial fold complete and with a median lobe. *Barbels*—the maxillary pair reach to below hind edge of eye, the rostral pair are shorter. *Fins*—dorsal 2/3 as high as the body, its origin is anterior to the insertion of the ventral, its upper edge concave, its last undivided ray osseous, weak, with its bony portion equalling the post-orbital length of the head. *Lateral-line*—complete, $1\frac{1}{2}$ rows of scales between it and the ventral fin: 9 rows anterior to the dorsal. Free portion of the tail rather longer than high. *Colours*—bluish, becoming white on the abdomen. Fins usually blue. Eyes red. Sometimes the fish is brown: and the dorsal, pectoral, and ventral, red. Or the front edge of dorsal and anal and upper and lower borders of the caudal may be dark.

I have seen an example in which the height of the body was only 4 in the total length, but it otherwise resembled the typical form.

Habitat.—From South Canara down the Western Ghauts to the Travancore hills. Mr. Ballard has captured it at Courtallum with a fly. It attains at least 18 inches in length.

31. Barbus innominatus.

Leuciscus binotatus, Blyth, Journ. Asiat. Soc. of Beng. 1858, p. 290 (not K. and v. H.)
Barbus innominatus, Day, Proceedings Zool. Soc. 1869, p. 556.

B. iii, D. 12 ($\frac{3}{9}$), P. 15, V. 9, A. 7 ($\frac{2}{5}$), C. 17, L. l. 24, L. tr. $4\frac{1}{2}/4\frac{1}{2}$.

Length of head $3\frac{1}{2}$, of caudal $3\frac{1}{2}$, height of body $3\frac{1}{3}$ in the total length. *Eyes*—diameter $3\frac{1}{2}$ in length of the head, 1 diameter from the end of the snout and also apart. *Barbels*—the rostral nearly reach the orbit, the maxillary pair are shorter. *Fins*—dorsal commences midway between the snout and the base of the caudal, its last undivided ray osseous, weak, and entire. Caudal forked. *Lateral-line*—3 rows of scales between it and the base of the ventral fin. *Colours*—a black spot at the base of the caudal fin, none now apparent on the dorsal.

Habitat.—Ceylon, from whence Mr. Blyth received specimens up to 1·1 inches in length, presented by Dr. Kelaart.

32. Barbus compressus.

Day, Proc. Zool. Soc. 1869, p. 555.

B. iii, D 12 ($\frac{3}{9}$), P. 15, V. 9, A. 8 ($\frac{3}{5}$), C. 17, L. l. 22, L. tr. 4/5.

Length of head 5, of caudal 5, height of body 4 in the total length. *Eyes*—diameter 2/9 of length of head, $1\frac{1}{2}$ diameters from end of snout and also apart. Head much compressed: mouth inferior, upper jaw the longer: the whole of the cheeks covered with pores: the posterior extremity of the maxilla extends to below the anterior margin of the orbit. *Barbels*—rostrals reach to beneath the centre of the orbit, the maxillary to the angle of the preopercle. *Fins*—dorsal half as high as the body, it arises midway between the snout and the base of the caudal, commencing slightly in advance of the ventrals, its last undivided ray is osseous, not enlarged, and entire. Upper caudal lobe the longer. *Lateral-line*—complete, $3\frac{1}{2}$ rows of scales between it and the base of the ventral fin. *Colours*—silvery, fins stained darker.

Habitat.—The native country of the type specimen is uncertain, but the fish was found in a bottle in the Calcutta Museum with an *Oreinus* from Cashmere. It is a fine specimen in excellent preservation.

33. Barbus Blythii.

Capoeta macrolepidota (? K. and v. Hass.), Blyth, J. A. S. of Beng. 1860, p. 157 (not C.V.).
Barbus Blythii, Day, Proc. Zool. Soc. 1869, p. 555.

B. iii, D. 12 ($\frac{3}{9}$), P. 15, V. 9, A. 8 ($\frac{3}{5}$), C. 17, L. l. 22, L. tr. 4/5.

Length of head 4, of caudal 4, height of body $3\frac{1}{2}$ in the total length. *Eyes*—diameter 2/5 of length of head, 3/4 of a diameter from the end of snout and also apart. Preorbital covered with pores. *Barbels*—well developed, the rostral reaching the eye, and the maxillary to below the centre of the orbit. *Fins*—dorsal arises midway between the snout and the base of the caudal, its last undivided ray articulated: it commences slightly in advance of the ventrals. Caudal deeply forked. *Lateral-line*—complete, $2\frac{1}{2}$ rows between it and the base of the ventral fin. *Colours*—uniform silvery in spirit.

Habitat.—Tenasserim provinces. Specimen two inches long. This fish is very similar to *Barbus compressus*, and may perhaps be the young.

34. Barbus melanampyx, Plate CXXXIX, fig. 1.

Cirrhinus fasciatus, Jerdon, M. J. L. and Sc. 1849, p. 305 (not Bleeker).
Labeo melanampyx, Day, Proc. Zool. 1865, p. 317.
Puntius melanampyx, Day, Fishes of Malabar, p. 210, pl. 16, f. 1.
Barbus Grayi, Day, Proc. Zool. Soc. 1867, p. 293.
Barbus arulius, Günther, Catal. vii, p. 133 (not Jerdon).

B. iii, D. 11 ($\frac{3}{8}$), P. 15, V. 8, A. 7 ($\frac{2}{5}$), C. 15, L. l. 20, L. tr. $3\frac{1}{2}/3\frac{1}{2}$.

Length of head $4\frac{1}{2}$, of caudal 4 to $4\frac{1}{2}$, height of body 3 to $3\frac{1}{3}$ in the total length. *Eyes*—diameter 3 to $3\frac{1}{2}$ in the length of head, from 3/4 to 1 diameter from end of snout, 1 diameter apart. Dorsal profile more convex than that of the abdomen. Cleft of mouth extends to below the anterior edge of the orbit: numerous pores on the snout. Lower labial fold interrupted. *Barbels*—rostral short, the maxillary equal in length to one diameter of the orbit. *Teeth*—pharyngeal, in three rows, curved, sharp, 5, 3, 2/2, 3, 5. *Fins*—dorsal scarcely higher than long, no osseous ray: it commences midway between the end of the snout and the base of the caudal fin, which latter is deeply forked. *Lateral-line*—complete, 2 rows of scales between it and the base of the ventral fin: 7 rows before the dorsal fin. *Colours*—of a deep dull red, with three black cross bands, the

first from below the whole of the base of the dorsal to just beneath the lateral-line, the second commences four scales beyond the posterior extremity of the base of the dorsal and descends to one scale below the lateral-line, whilst the last is just before the base of the caudal and often wanting. Fins pinkish, edged with black.

Habitat.—The Wynaad, Neilgherry and Travancore ranges of hills and streams along their bases: also the Cauvery river. It rarely attains three inches in length.

B.—*With two barbels* (*Capoëta*).

a. With an osseous, serrated dorsal ray.

35. **Barbus macrolepidotus**, Plate CXLII, fig. 1.

Capoëta macrolepidota, Cuv. and Val. xvi, p. 280, pl. 477; Cantor, Catal. p. 267; Bleeker, Oost-Java, p. 21.

Hampala macrolepidota, (Kuhl and Van Hass.), Bleek. Prod. Cyp. p. 308, and Atl. Ich. Cyp. p. 112, t. 38, f. 2.

Barbus hampal, Günther, Catal. vii, p. 139.

B. iii, D. 12($\frac{4}{8}$), P. 17, V. 9, A. 7($\frac{2}{5}$), C. 19, L. l. 26, L. tr. 5/5.

Length of head $4\frac{1}{2}$, of caudal 5, height of body $4\frac{1}{4}$ in the total length. *Eyes*—diameter 5 to $5\frac{1}{4}$ in the length of head, $1\frac{1}{2}$ diameters from end of snout and also apart. Snout pointed, upper jaw slightly the longer; head compressed with its upper surface nearly flat. The posterior extremity of the maxilla extends to a little behind the anterior edge of the orbit. No pores on the snout. *Barbels*—the maxillary as long as the orbit. *Fins*—dorsal commences slightly nearer the snout than the base of the caudal, and opposite the insertion of the ventrals, its last undivided ray is weak, (scarcely osseous), and finely serrated in nearly its whole extent. Caudal deeply forked. *Lateral-line*—with $2\frac{1}{2}$ rows of scales between it and the base of the ventral fin: 10 rows before the dorsal fin. Free portion of the tail as high at its base as it is long. *Colours*—silvery, lightest on the sides and below: fins orange, anterior edge of the dorsal and outer margins of the caudal black. A badly developed darkish band from the dorsal to the ventral fin.

Habitat.—Tavoy to the Malayan Peninsula: an example, personally obtained from the first locality, is figured life-size.

b. Osseous dorsal ray strong, entire.

36. **Barbus chola**, Plate CXLII, fig. 4.

Cyprinus chola, Ham. Buch. Fish. Gang. pp. 312, 389; Cuv. and Val. xvi, p. 410.

Systomus chola, McClelland, Ind. Cyp. pp. 286, 384, pl. 58, f. 3; Jerdon, M. J. L. and S. 1849, p. 316.

Systomus immaculatus, Blyth, J. A. S. of B. 1860, p. 157.

Capoeta chola, Bleeker, Beng. p. 62.

Systomus sophore? Bleeker, Beng. p. 127.

Puntius perlec, Day, Malabar Fish. p. 211.

Barbus liacanthus, (pt.) *sophoroides*, *chola*, and *thermalis*, Günther, Catal. vii, pp. 141, 143, 144.

Koroon, Tam.: *Kerrundi*, Beng.: *Nga-khon-ma*, and *Nga-lowah*, Burmese: *Pittha-kerrundi*, "bitter carp" Ooriah: *Chaddu paddaka*, Tel.: *Katcha karawa*, Hind.

B. iii, D. 11($\frac{3}{8}$), P. 15, V. 9, A. 7($\frac{2}{5}$), C. 19, L. l. 26-28, L. tr. $5\frac{1}{2}$/5.

Length of head $4\frac{1}{2}$ to $4\frac{3}{4}$, of caudal $4\frac{1}{2}$, height of body $3\frac{1}{4}$ to $3\frac{3}{4}$ in the total length. *Eyes*—diameter $3\frac{1}{2}$ to 4 in the length of the head, 3/4 to 1 diameter from end of snout, and $1\frac{1}{4}$ apart. Suborbital ring of bones narrow, their depth not being 1/3 of that of the uncovered portion of the cheek. Interorbital space slightly convex. Dorsal profile more convex than that of the abdomen. Jaws equal anteriorly. *Barbels*—a single maxillary pair not so long as one diameter of the orbit. *Fins*—dorsal 3/5 as high as the body, it commences opposite the ventrals and midway between the end of the snout and the base of the caudal fin, its last undivided ray is osseous and smooth, with the stiff portion moderately strong and as long as the head excluding the snout. *Lateral-line*—complete, from 3 to $3\frac{1}{2}$ rows of scales between it and the base of the ventral fin: 10 to 12 rows before the dorsal fin. Free portion of the tail rather higher than long. *Colours*—silvery, opercles shot with purple and gold. A dark blotch is usually present on the side of the free portion of the tail from the 23rd to the 25th scales of the lateral-line; in some Malabar examples it is intensely black. A dark mark along the base of the anterior of the dorsal rays, and a row of dark spots along its centre. Occasionally there is a dark mark behind the gill-opening, especially in Bengal and Assam examples.

In Burma the dorsal spine is stout, and that fin as well as the anal low. In Bengal and Punjab examples the eye is rather large, often being 1/3 of the length of the head. In two species from Central India, received from Captain Neill, the head is small, barbels short, and no black mark exists except the spot behind the gill-opening.

Habitat.—From Malabar and the Wynaad, through Madras, Orissa, the Punjab, Bengal, and Gangetic Provinces, the Central Provinces, Assam, also Akyab and Burma to Mergui. It attains to about 5 inches in length. As food it is bitter: in some localities in Burma oil is obtained from it during the breeding season. The figure (life-size) is from a Madras specimen.

37. **Barbus parrah**, Plate CXLII, fig. 3.

Puntius parrah, Day, Proc. Zool. Soc. 1865, p. 301, and Malabar Fishes, p. 211, pl. 7, f. 3; Günther, Catal. vii, p. 142, *(passim)*.

Parrah perlee, Mal.: *Kutcha-karawa*, Hind.

B. iii, D. 11($\frac{3}{8}$), P. 15, V. 9, A. 8($\frac{3}{5}$), C. 19, L. l. 25-26, L. tr. 5/5.

Length of head 5, of caudal $4\frac{1}{2}$ to 5, height of body $3\frac{3}{4}$ to 4 in the total length. *Eyes*—diameter 3 to $3\frac{1}{4}$ in the length of the head, 3/4 to 1 diameter from end of snout, $1\frac{1}{4}$ diameters apart. Interorbital space slightly convex: the third suborbital bone 2/3 as deep as the uncovered portion of the cheek below it. Dorsal profile more convex than that of the abdomen. *Barbels*—fine, and equal to two-thirds of the length of the orbit. *Fins*—dorsal commences midway between the end of the snout and the base of the caudal fin, its last undivided ray is osseous, weak in the young but strengthening with age, and as long as the head without the snout: height of fin 2/3 that of the body. *Lateral-line*—complete, $3\frac{1}{2}$ rows of scales between it and the base of the ventral fin: 8 rows before the dorsal fin. *Colours*—back greenish, divided from a silvery abdomen by a dark bluish line. Cheeks golden red. Pectoral, ventral, and anal tinged with yellow; dorsal and caudal dusky. A diffused black spot on the lateral-line extending from the twentieth to the twenty-second scales. Eyes golden.

Habitat.—Malabar, Mysore, and Madras, attaining at least 6 inches in length. The example figured (life-size) was from Kurriavanoor in the Cochin State.

38. **Barbus Burmanicus**, Plate CXLI, fig. 4.

B. iii, D. 12($\frac{4}{8}$), P. 15, V. 9, A. 7($\frac{2}{5}$), C. 17, L. l. 26, L. tr. 4/4.

Length of head $4\frac{1}{2}$ to 5, of caudal $4\frac{1}{2}$ to 5, height of body $3\frac{1}{3}$ in the total length. *Eyes*—diameter $3\frac{1}{4}$ to $3\frac{1}{2}$ in the length of the head, 1 diameter from the end of snout, and $1\frac{1}{2}$ apart. A considerable rise from the snout to the base of the dorsal fin. Snout pointed. Interorbital space convex. The maxilla does not reach to below the orbit. Lower labial fold interrupted. *Barbels*—a very short maxillary pair. *Fins*—dorsal 2/3 as high as the body, it commences midway between the end of the snout and the base of the caudal and opposite the insertion of the ventral, its last undivided ray is osseous, strong, entire, and about as long as the head. *Lateral-line*—2 rows of scales between it and the base of the ventral fin: 10 rows before the dorsal fin. *Colours*—silvery along the back, becoming lighter on the sides and beneath: a dull blotch before the base of the caudal fin. Fins silvery, with a dull band down the centre of the dorsal.

This species is allied to *B. chola*, but has shorter barbels, a stronger dorsal spine, and only 2 rows of scales between the lateral-line and base of ventral fin, &c.

Habitat.—Burma, the example (figured life-size) was from Mergui.

39. **Barbus tetrarupagus**, Plate CXLII, fig. 6.

? *Cyprinus titius* and *tictis*, Ham. Buch. Fish. Ganges, pp. 315, 389; Cuv. and Val. xvi, p. 399.

? *Systomus tetrarupagus*, McClell. Ind. Cyp. pp. 285, 381, pl. 44, f. 3.

Systomus titius, Bleeker, Beng. p. 62.

Barbus titius, Günther, Catal. vii, p. 154.

Tit pungti, Bengali: *Borajalee*, Assamese: *Pet-toh-ee*, Sind.

B. iii, D. 10-11($\frac{2-3}{8}$), P. 17, V. 9, A. 7($\frac{2}{5}$), C. 19, L. l. 24-26, L. tr. 5-$5\frac{1}{2}$/5.

Length of head 4 to $4\frac{1}{4}$, of caudal $4\frac{1}{2}$, height of body 3 to $3\frac{1}{4}$ in the total length. *Eyes*—diameter 2/7 of length of head, 1 diameter from end of snout, and $1\frac{1}{3}$ apart. Interorbital space slightly convex. Body compressed. Lower labial fold interrupted. Dorsal profile considerably elevated. *Barbels*—a maxillary pair, thin and equal to 2/3 of the length of the orbit. *Fins*—dorsal 2/3 as high as the body, it commences opposite the insertion of the ventral, and midway between the snout and the base of the caudal: osseous dorsal ray of moderate strength, and its stiff portion as long as the head excluding the snout. *Lateral-line*—complete, $3\frac{1}{2}$ rows of scales between it and the base of the ventral: 8 to 10 rows before the dorsal fin. Free portion of the tail as long as high. *Colours*—a round black spot on the lateral-line behind the gill-openings, and a second midway between the end of anal and base of the caudal fins, and rather more forward than in *B. chola*, being on the 18th to 20th scales of the lateral-line. Dorsal and anal tipped with black, sometimes the upper half of the former stained darkish, and a black band along its centre, most distinct anteriorly, and more so in Assam than in Bengal specimens.

Hamilton Buchanan observes that *C. titius* and *C. ticto* have the utmost resemblance, and should *Barbus punctatus* be found as far East as Calcutta it might possibly be *B. titius*. McClelland says this species is without barbels, and the dorsal and abdominal profiles equally convex. He shows the eye too small, and unites the marks on the dorsal fin: still it seems to be this species which I have obtained from the same locality as McClelland.

Habitat.—Orissa, Bengal, Assam, N. W. Provinces, Punjab and Sind, also the Deccan. It attains nearly 5 inches in length. The specimen figured (life-size) was from Assam.

40. Barbus dorsalis, Plate CXLII, fig. 2.

Systomus dorsalis and *? tristis*, Jerdon, M. J. L. and Sc. 1849, pp. 314, 316.
Barbus dorsalis, *tetraspilus*, and *Layardi*, Günther, Catal. vii, pp. 142, 144.
Lambi kaoli, Hin.: *Saal candee*, Tam.: *Mar-pakke*, Can.

B iii, D. 11-12 ($\frac{3-4}{8}$), P. 15, V. 9, A. 8 ($\frac{3}{5}$), C. 19, L. l. 24-25, L. tr. $4\frac{1}{2}/4$.

Length of head $4\frac{1}{2}$, of caudal $4\frac{1}{2}$ to 5, height of body 4 to $4\frac{1}{4}$ in the total length. *Eyes*—diameter 4 to $4\frac{1}{2}$ in length of head, from $1\frac{1}{4}$ to $1\frac{1}{2}$ diameters from end of snout, $1\frac{1}{2}$ diameters apart. Third suborbital bone as wide as the cheek below it. Body compressed, a considerable rise to the base of the dorsal fin. The head is conical anteriorly, the snout pointed, and the upper jaw the longer. Interorbital space flat. Lower labial fold interrupted. *Barbels*—a maxillary pair 2/3 as long as the eye. *Teeth*—pharyngeal, 5, 3, 2/2, 3, 5. *Fins*—dorsal commences rather in front of the ventral, and nearly midway between the end of the snout and base of the caudal fin, its last undivided ray is osseous, smooth, moderately strong, and its stiff portion as long as, or a little longer than, the head without the snout. Caudal forked. *Lateral-line*—complete. *Scales*—8 or 9 rows between occiput and base of dorsal fin: $2\frac{1}{2}$ rows between lateral-line and base of ventrals. Free portion of the tail as high as long. *Colours*—uniform silvery, frequently the scales in upper two-third of the body with dark bases. A black spot at the posterior portion of the base of the dorsal, which more or less disappears after maceration.

B. tatraspilus differs from *B. dorsalis* in having a dark spot before the base of the caudal fin.

Habitat.—Kurnool, Mysore, throughout Madras as low as the Cauvery and Coleroon rivers and Ceylon. It does not attain a large size. The specimen figured was from Madras.

c. *Last undivided dorsal ray articulated, or if osseous very weak.*

41. Barbus kolus, Plate CXLI, fig. 2.

Sykes, Trans. Zool. Soc. ii, p. 357, pl. 62, f. 1; Günther, Catal. vii, p. 136.
Capoeta kolus, Bleeker, Beng. p. 62.
Hypselobarbus (Gonoproktopterus) kolus, Bleeker, Prod. Cyp. p. 275.
Barbus Guentheri, Day, Proc. Zool. Soc. 1868, p. 582.
Nilusu, Telugu.

B. iii, D. 12-13($\frac{3-4}{9}$), P. 15, V. 9, A. 8($\frac{3}{5}$), C. 19, L. l. 40-43, L. tr. 10/8.

Length of head $5\frac{1}{4}$ to $5\frac{1}{2}$, of caudal 4, height of body 4 to $4\frac{1}{2}$ in the total length. *Eyes*—upper margin near the profile, diameter $3\frac{3}{4}$ to 4 in the length of the head, $1\frac{1}{4}$ diameters from end of snout and also apart. Interorbital space flat. Body compressed, a considerable rise in the profile from the occiput to the dorsal fin. Upper jaw the longer, overlapping the lower. *Barbels*—extend rather beyond the middle of the eye. *Teeth*—pharyngeal, pointed, uncinate, 5, 3, 2/2, 3, 5. *Fins*—the dorsal 3/4 as high as the body, inserted in advance of the ventral and rather nearer the snout than the base of the caudal fin, which last is deeply forked. *Lateral-line*—complete, 4 to 5 rows of scales between it and the base of the ventral fin. Free portion of the tail rather longer than high. *Colours*—silvery, with a tinge of yellow: dorsal, caudal, and anal tipped with gray.

Habitat.—Central Provinces, Deccan, and throughout the Kistna, Tamboodra, and Godavery rivers. It attains upwards of a foot in length.

42. Barbus Denisonii, Plate CXLIII, fig. 2.

Labeo Denisonii, Day, Proc. Zool. Soc. 1865, p. 299.
Puntius Denisonii, Day, Fish. Malabar, p. 212, pl. 16, f. 2.
Barbus Denisonii, Günther, Catal. vii, p. 146.

B. iii, D. 10-11 ($\frac{2-3}{8}$), P. 15, V. 9, A. 8 ($\frac{3}{5}$), C. 19, L. l. 28, L. tr. $4\frac{1}{2}/4\frac{1}{2}$.

Length of head 6, of caudal 5, height of body 5 in the total length. *Eyes*—diameter $3\frac{1}{2}$ in the length of head, 1 diameter from end of snout, and $1\frac{1}{2}$ apart. Dorsal and abominal profiles slightly and about equally convex. Mouth small, directed forwards and rather downwards, with upper jaw slightly the longer. Snout obtuse. Lower labial fold interrupted. *Barbels*—a maxillary pair one-third longer than the orbit. *Teeth*—pharyngeal, pointed and curved at their extremities, 4, 3, 2/2, 3, 4. *Fins*—dorsal arises rather before the ventrals, and midway between the end of the snout and the posterior extremity of the base of the anal fin, none of its rays osseous. Caudal deeply forked. *Lateral-line*—complete, $2\frac{1}{2}$ rows of scales between it and ventral fin: 9 rows before the dorsal fin. Caudal peduncle rather longer than high. *Colours*—silvery, with a black band passing from the snout to the centre of the base of the caudal fin, above it runs a horizontal scarlet stripe. Caudal with an oblique black band crossing the posterior third of each lobe.

Habitat.—Mundikyum in the Travancore hill ranges, where the Rev. H. Baker procured several specimens for me. It attains six inches in length.

43. Barbus melanostigma, Plate CXLIII, fig. 1.

Systomus Carnaticus, Jerdon, M. J. L. and Science, 1849, p. 315.

B. iii, D. 10 ($\frac{2}{8}$), P. 15, V. 9, A. 7 ($\frac{2}{5}$), C. 19, L. l. 26, L. tr. 5/4.

Length of head $4\frac{1}{2}$ to $4\frac{2}{3}$, of caudal $4\frac{2}{3}$, height of body $3\frac{1}{2}$ to $3\frac{2}{3}$ in the total length. *Eyes*—diameter $3\frac{1}{3}$ in the length of the head, 1 diameter from the end of snout, and $1\frac{1}{2}$ apart. Dorsal and abdominal profiles about equally convex: a slight depression over the nape: interorbital space nearly flat. Mouth narrow, upper jaw overlapping the lower: lower labial fold interrupted. Third suborbital bone as deep or rather deeper than the uncovered portion of the cheek below it. *Barbels*—a maxillary pair about half as long as the orbit. *Fins*—dorsal 3/4 as high as the body, having a concave upper edge, commencing rather in advance of the insertion of the ventral, it is midway between the end of the snout and the base of the caudal fin, its last undivided ray very weak, osseous inferiorly, and articulated in its upper half. Caudal deeply forked. Free portion of the tail rather higher than long. *Lateral-line*—complete, very slightly concave: 3 rows of scales between it and the base of the ventral fin: 8 rows before the dorsal. *Colours*—silvery superiorly, becoming white on the sides and beneath, a light band along the side: a deep black blotch on the side of the tail, commencing on the twenty-first or twenty-second scales: dorsal and caudal stained with gray, sometimes a dark band along the side.

This fish has a very much deeper body than *B. amphibius*, and also a much darker blotch on the side of the tail. Its mouth is not so anterior as in *B. chola*, and its third suborbital much deeper, &c.

Habitat.—Wynaad hills in Malabar. Jerdon also obtained specimens in the Bowany river and from the Cauvery.

44. Barbus arenatus, Plate CXLII, fig. 7.

B. iii, D. $10(\frac{2}{8})$, P. 15, V. 9, A. $8(\frac{3}{5})$, C. 19, L. l. 26, L. tr. 4/6.

Length of head $4\frac{3}{4}$, of caudal 6, height of body 4 in the total length. *Eyes*—diameter $4\frac{1}{2}$ to 5 in the length of the head, $1\frac{1}{2}$ diameters from end of snout, and 2 apart. Suborbital ring of bones very narrow. Body thick, its width equalling 4/7 of its height. Dorsal profile more convex than that of the abdomen. The maxilla does not reach to below the orbit. *Barbels*—a single maxillary pair which reaches to beneath the first third of the eye. No pores on the head. *Fins*—last undivided dorsal ray fine, smooth, osseous inferiorly, becoming articulated superiorly, the fin commences before the insertion of the ventral and midway between the end of the snout and the base of the caudal fin. *Lateral-line*—complete, $3\frac{1}{2}$ rows of scales between it and the base of the ventral fin: 11 rows anterior to the dorsal fin. *Colours*—silvery, without any markings. In some examples a darkish band along the dorsal fin.

Habitat.—Madras. The example is figured life size.

45. Barbus Puckelli, Plate CXLIII, fig. 5.

Puntius (Capoëta) Puckelli, Day, Proc. Zool. Soc. 1868, p. 197.

B. iii, D. $9(\frac{2}{7})$, P. 15, V. 9, A. $8(\frac{3}{5})$, C. 19, L. l. 24, L. tr. 4/5.

Length of head $5\frac{1}{4}$, of caudal 6, height of body $4\frac{1}{2}$ in the total length. *Eyes*—diameter $3\frac{1}{2}$ in the length of head, 2/3 of a diameter from end of snout, and $1\frac{1}{2}$ diameters apart. Dorsal and abdominal profiles both equally and slightly convex, whilst the thickness of the fish equals its height. Mouth almost anterior, upper jaw slightly the longer. The posterior extremity of the maxilla does not reach to below the orbit. No pores on the head, its summit rather convex. *Barbels*—a thick maxillary pair, reaching to beneath the anterior edge of the eye. *Teeth*—pharyngeal, plough-shaped, 5, 3, 2/2, 3, 5. *Fins*—last undivided dorsal ray weak and cartilaginous, the fin commences before the ventral, and midway between the end of the snout and the base of the caudal, which last is lobed in its posterior half. *Lateral-line*—complete, $2\frac{1}{2}$ rows of scales between it and the base of the ventral fin: 10 rows before the base of the dorsal fin. *Colours*—greenish-yellow along the back, with a red mark on the opercle, and a scarlet stripe extending along the middle of the side. A deep black mark on the dorsal fin from the base of the third to that of the sixth branched rays. Very fine dark spots over the scales especially at their bases. An indistinct black mark on the lateral-line from the nineteenth to the twenty-first scales.

Habitat.—Bangalore, where it is said to be common. The figure is from a single specimen given me by Major Puckell.

46. Barbus amphibius, Plate CXLII, fig. 8.

Capoëta amphibia, Cuv. and Val. xvi, p. 282, pl. 478; Bleeker, Beng. p. 62.
Systomus amphibius, Jerdon, M. J. L. and S. 1849, p. 315.
Puntius Hamiltonii, Day, Fishes of Malabar, p. 213.
Barbus amphibius, Günther, Catal. vii, p. 144; Day, Proc. Zool. Soc. 1870, p. 373.
Oolee perlee, Mal.

B. iii, D. $10\text{-}11(\frac{2-3}{8})$, P. 15, V. 9, A. $7(\frac{2}{5})$, C. 19, L. l. 23-24, L. tr. 5/4.

Length of head $4\frac{3}{4}$ to 5, of caudal 5, height of body $4\frac{1}{4}$ to 5 in the total length. *Eyes*—diameter $3\frac{1}{2}$ in the length of head, 1 diameter from end of snout, and $1\frac{1}{4}$ apart. Interorbital space nearly flat. Mouth narrow, snout somewhat rounded, the upper jaw slightly the longer. *Barbels*—a thin maxillary pair reaching to below the centre of the eye. *Fins*—the dorsal 2/3 as high as the body, with its osseous ray feeble, smooth, and half as long as the head, it arises somewhat in advance of the ventrals, and rather nearer the end of snout than

the base of the caudal: the latter fin deeply forked. *Lateral-line*—complete, 2 rows of scales between it and the base of the ventral fin: 8 rows before the dorsal. Free portion of the tail rather longer than high. *Colours*—upper half of body steel-blue, becoming white tinged with golden on the sides and beneath. Sometimes a band along the side, and a black spot on either side of the tail anterior to the caudal fin, this becomes indistinct after specimens have been long macerated, but is very apparent in fresh ones especially those from the Malabar coast; it is not well-marked, and often absent in those taken in Bombay. Fins yellowish, upper edge of dorsal usually stained with black. In the monsoon time a crimson band along the sides is sometimes present.

Habitat.—Central India, Deccan, Bombay and the Western coast of India, Madras and up the coast as high as Orissa. Generally attaining to about 6 inches in length. The specimen figured (life-size) was from Jubbulpore.

47. Barbus arulius, Plate CXLII, fig. 5.

Systomus arulius and *rubrotinctus*, Jerdon, M. J. L. and S. 1849, p. 317.
Puntius arulius, Day, Proc. Zool. Soc. 1867, p. 294.
Barbus arulius, Day, l. c. 1868, p. 585, and 1870, p. 373, (not Günther).

B. iii, D. 11($\frac{3}{8}$), P. 15, V. 9, A. 7($\frac{2}{5}$), C. 18, L. l. 21-23, L. tr. $4\frac{1}{2}/4\frac{1}{2}$.

Length of head $4\frac{1}{2}$ to 5, of caudal $4\frac{1}{2}$ to 5, height of body $3\frac{3}{4}$ to 4 in the total length. *Eyes*—diameter $3\frac{1}{2}$ in the length of the head, 1 diameter from the end of snout and also apart. Dorsal profile rather more convex than that of the abdomen. Upper jaw overlapping the lower. Lower labial fold interrupted. *Barbels*—a pair of long maxillary ones. *Teeth*—pharyngeal, 5, 3, 2/2, 3, 5, sharp and curved at their extremities. *Fins*—no osseous dorsal ray, the fin which is 2/3 as high as the body commences midway between the end of the snout and the base of the caudal, which last is deeply emarginate. *Lateral-line*—complete, $2\frac{1}{2}$ rows of scales between it and the base of the ventral fin: 9 rows before the base of the dorsal fin. Free portion of the tail as high at its base as it is long. *Colours*—olive-green on the back, becoming silvery-white dashed with reddish green over the abdomen. A black blotch, about two scales in width, passes from below the origin of the dorsal fin as low as the lateral-line: a second from just below the posterior extremity of the dorsal to the base of the anal: and a third across the free portion of the tail before the caudal fin. Dorsal, caudal and anal pinkish with a black bar across the summit of the first, whilst the caudal is stained at its edges.

In *Barbus rubrotinctus*, the barbels appear to have been overlooked.

Habitat.—Wynaad and Neilgherry range of hills and the rivers at their bases, and at least as far south as Cottayam in Travancore: also in the Cauvery, from whence it has been procured at Seringapatam where it is termed *Aruli*. It attains 4 inches or more in length. The example figured (life-size) was from the Wynaad.

48. Barbus Mahecola, Plate CXL, fig. 5.

Leuciscus Mahecola, Cuv. and Val. xvii, p. 305, pl. 502 (Barbels omitted); Bleeker, Beng. p. 68; Jerdon, Madr. Journ. Lit. and Science, 1849, p. 322.
Barbus filamentosus, Günther, Catal. vii, p. 145 (not Cuv. and Val.).
Puntius (Capoëta) lepidus, Day, Proc. Zool. Soc. 1868, p. 196.

B. iii, D. 11 ($\frac{3}{8}$), P. 15, V. 9, A. 7 ($\frac{2}{5}$), C. 19, L. l. 21, L. tr. 5/4.

Length of head $4\frac{3}{4}$ to 5, of caudal 4 to $4\frac{1}{4}$, height of body $3\frac{1}{4}$ to $3\frac{1}{2}$ in the total length. *Eyes*—diameter $3\frac{1}{4}$ in length of head, 1 diameter from end of snout, $1\frac{1}{2}$ diameters apart. Body compressed. Lower jaw the shorter. Lower labial fold interrupted in the mesial line. In some specimens the snout is covered with large pores. *Barbels*—a thin maxillary pair extending to below the centre of the orbit in some specimens, very minute in others (see remarks, p. 556). *Fins*—last undivided dorsal ray articulated, smooth, feeble: the branched rays are elongated in the adult, the fin commences midway between the snout and the base of the caudal fin. Caudal deeply lobed. *Lateral-line*—complete, $2\frac{1}{2}$ rows of scales between it and the base of the ventral. Free portion of the tail rather higher at its base than it is long. *Colours*—silvery white, with a deep black oval mark on the lateral-line from about the fourteenth to the eighteenth scales. A dark band along the dorsal fin. Caudal red, tipped with black.

Having examined the type of *Leuciscus Mahecola*, I find it to be this species. The barbels were overlooked by both the Artist and Valenciennes. The length of the barbels varies in this species, as has been observed (see p. 556). In the Bowany river the snout is very tuberculated, as also in examples from Pondicherry. Some examples have a dark spot behind the gill-opening.

Habitat.—From Canara down the Western coast and along the base of the Neilgherries, and Travancore hills, also Ceylon. It attains at least 6 inches in length.

C. *Without barbels (Puntius).*

a. Last undivided dorsal ray osseous and serrated.

49. Barbus apogon, Plate CXLI, fig. 3.

Barbus apogon, (Kuhl) Cuv. and Val. xvi, p. 392; Günther, Catal. vii, p. 150.
Systomus apogon and *apogonoides*, Bleeker, Nat. Tyds. Ned. Ind. iii, p. 428, and ix, p. 150.

Cyclocheilichthys (anematichthys) apogon and *apogonoides*, Bleeker, Prod. Cyp. pp. 378, 379, and Atl. Ich. Cyp. pp. 88, 89, t. 29, f. 2, and t. 30, f. 3.

Systomus macularius, Blyth, J. A. S. of B. 1860, p. 159.

Barbus macularius, Günther, Catal. vii, p. 150; Day, Proc. Zool. Soc. 1869, p. 557.

Nga-ta-zee and *Nga-lay-toun*, Burmese.

B. iii, D. 12 ($\frac{4}{8}$), P. 17, V. 10, A. 8 ($\frac{3}{5}$), C. 19, L. l. 36-37, L. tr. $7\frac{1}{2}$/7.

Length of head $5\frac{1}{4}$, of caudal 4, height of body $3\frac{1}{4}$ in the total length. *Eyes*—diameter $3\frac{1}{2}$ to 4 in the length of the head, 1 to $1\frac{1}{4}$ diameters from the end of snout and also apart. Body strongly compressed, and rising abruptly from the nape to the base of the dorsal fin. Lower jaw overlapped by the upper when the mouth is closed. *Fins*—dorsal arises rather behind the insertion of the ventral and midway between the front edge of the eye and the base of the caudal fin, its last undivided ray strong, serrated, and its stiff portion rather shorter than the head. First three anal rays rather stiff. Caudal deeply forked. *Lateral-line*—complete, $5\frac{1}{2}$ (4 in some specimens) rows of scales between it and the ventral fin: 15 rows of scales anterior to the base of the dorsal fin. Free portion of the tail as high at its base as it is long. *Colours*—silvery, each scale with a dark spot at its base.

Habitat.—Tenasserim and throughout Burma (certainly as high as Mandalay) to the Malay Archipelago. It attains at least 8 inches in length.

50. Barbus ambassis, Plate CXLV, fig. 1.

Day, Proc. Zool. Soc. 1868, p. 583.

Bunkuai, Ooriah.

B. iii, D. 11 ($\frac{3}{8}$), P. 11, V. 9, A. 7 ($\frac{2}{5}$), C. 19, L. l. 36, L. tr. 6/8.

Length of head 5 to $5\frac{1}{2}$, of caudal 4, height of body $3\frac{1}{2}$ in the total length. *Eyes*—diameter nearly 2/5 of length of head, 1/2 diameter from end of snout, 1 diameter apart. Upper jaw slightly the longer. *Barbels*—absent. *Teeth*—pharyngeal, sharp, crooked, 5, 3, 2/2, 3, 5. *Fins*—dorsal spine osseous, strong, and posteriorly serrated, having about 15 teeth, the fin commences slightly anterior to the ventral, and midway between the end of the snout and the base of the caudal, which last is deeply lobed. *Scales*—small and deciduous. *Lateral-line*—incomplete, becoming indistinct in the posterior two-thirds of the body, 6 rows of scales between it and the base of the ventral fin: 15 rows before the dorsal fin. *Colours*—light greenish, with a silvery band along the side. A small black spot at the base of the anterior dorsal rays, and a black blotch at the side of the tail.

Habitat.—Madras, Orissa, Bengal, and Assam at least as high as Suddya. It attains about 3 inches in length.

51. Barbus conchonius, Plate CXLIII, fig. 7.

Cyprinus conchonius, Ham. Buch. Fish. Gang. pp. 317, 389; Cuv. and Val. xvi, p. 394.

Systomus conchonius and *pyrrhopterus*, McClell. Ind. Cyp. pp. 285, 286, 383, 384, pl. 44, f. 1 and 8 (from Ham. Buch. MSS.); Bleeker, Beng. pp. 60, 62.

Barbus conchonius and *pyrrhopterus*, Günther, Catal. vii, pp. 153, 157.

Kunchon pungti, Bengali.

B. iii, D. 11 ($\frac{3}{8}$), P. 11, V. 9, A. 7 ($\frac{2}{5}$), C. 19, L. l. 24-26, L. tr. $5\frac{1}{2}$/$6\frac{1}{2}$.

Length of head 5, of caudal 4, height of body $2\frac{2}{3}$ in the total length. *Eyes*—diameter 1/3 of length of head, nearly 1 diameter from end of snout, and $1\frac{1}{4}$ apart. Body elevated. A slight concavity over the nape, followed by a considerable rise to the base of the dorsal fin. *Barbels*—absent. *Fins*—the dorsal 3/5 as high as the body, its last undivided ray osseous, moderately strong and serrated, as long as the head without the snout: the fin commences rather anterior to the insertion of the ventral, and midway between the anterior extremity of the orbit and the base of the caudal, which latter is forked in its last half. *Lateral-line*—incomplete, ceasing after 8 or 10 scales: 4 to $4\frac{1}{2}$ rows of scales between it and the base of the ventral fin: 9 rows before dorsal fin. Free portion of the tail as high at its base as it is long. *Colours*—a large round black spot on the middle of the side above the posterior portion of the anal fin: opercles lake colour. Fins orange, dorsal with its upper half blackish.

Nainee tal specimens have the dorsal spine much less coarsely serrated than those from the plains, from whence they were introduced not many years since; they have also a darkish band along the side.

Habitat.—Assam, Lower Bengal, Orissa, Behar, N. W. Provinces, Punjab, and the Deccan: attaining at least 5 inches in length.

52. Barbus ticto, Plate CXLIV, fig. 7.

Cyprinus ticto, Ham. Buch. pp. 314, 389, pl. 8, f. 87; Cuv. and Val. xvi, p. 393.

Systomus ticto, McClell. Ind. Cyp. p. 382; Bleeker, Beng. pp. 62, 128; Jerdon, M. J. L. and Sc. 1849, p. 318.

Rohtee ticto, Sykes, Trans. Zool. Soc. 1841, p. 365.

Systomus tripunctatus, Jerdon, M. J. L. and Sc. 1849, pp. 316, 317.

Barbus ticto, Günther, Catal. vii, p. 153.
Kaoli and *Kotree*, Hind.: *Kah-nee potiah*, Assam.

B. iii, D. 11 ($\frac{3}{8}$), P. 15, V. 9, A. 7 ($\frac{2}{5}$), C. 19, L. l. 23-26, L. tr. 5-6/6.

Length of head 5, of caudal $4\frac{1}{2}$ to 5, height of body 3 to $3\frac{1}{4}$ in the total length. *Eyes*—diameter 3 in length of head, 2/3 of a diameter from end of snout, 1 diameter apart. Body strongly compressed and elevated. Upper jaw slightly the longer. *Teeth*—pharyngeal, crooked, pointed, 5, 3, 2/2, 3, 5. *Fins*—osseous dorsal ray strong and serrated, three-quarters as long as the head, fin half as high as the body. Caudal forked. *Lateral-line*—incomplete, ceasing after 6 or 8 scales: 4 or 5 rows of scales between the lateral-line and base of the ventral fin, and 11 before the dorsal fin. *Colours*—silvery, sometimes stained with red, a black spot on the side of the tail before the base of the caudal fin and immediately behind the anal: a smaller one (frequently absent) at the commencement of the lateral-line. Fins often black, sometimes orange.

A single specimen from Calcutta shows a lateral-line distinct for 6 scales, indistinct for 10 more, when it ceases. Cutch examples have 23 to 25 scales along the lateral-line, and one specimen had two blotches on either side of the base of the caudal fin. In Sind the dorsal spine is thin and very finely serrated. One Ganjam example had L. l. 27, as had also one from Bheer Bhoom. In Orissa they had as a rule L. l. 25, in the Wynaad L. l. 23.

Habitat.—Sind, throughout India and Ceylon. The specimen figured (life-size) was from Assam. It rarely exceeds 4 inches in length.

53. **Barbus Stoliczkanus**, Plate CXLIV, fig. 8.

Barbus McClellandi, Day, Proc. Zool. Soc. 1869, p. 619 (not Cuv. and Val.)
Barbus Stoliczkanus, Day, Journal Asiatic Soc. Bengal, 1871, pt. ii, p. 328.

B. iii, D. 10-11($\frac{2-3}{8}$), P. 14, V. 9, A. 7($\frac{2}{5}$), C. 19, L. l. 25, L. tr. 5/6.

Length of head 1/6, of caudal 1/5, height of body 1/3 of the total length. *Eyes*—diameter 3 in length of head, 1/2 to 2/3 of a diameter from end of snout, $1\frac{1}{2}$ apart. Interorbital space flat. Mouth small. *Barbels*—absent. *Teeth*—pharyngeal, crooked, 5, 3, 2/2, 3, 5. *Fins*—osseous dorsal ray nearly as long as the head excluding the snout, serrated, but less strongly than in *B. ticto*, the serratures are likewise rather irregular, the fin commences midway between the snout and the base of the caudal, which latter is forked. *Lateral-line*—complete, there are $3\frac{1}{2}$ rows of scales between it and the base of the ventral fin: 9 rows before the dorsal fin. *Colours*—silvery, an oblong black mark on the lateral-line about the third scale, and a deep black mark above and a little behind the posterior extremity of the anal fin on the 18th and 19th scales, superiorly it extends almost to the back, whilst it is yellow anteriorly. Fins orange.

Some Darjeeling examples agree with the Burmese fish.

Habitat.—Eastern Burma, where it supersedes *B. ticto*. It attains 4 inches in length. The specimen figured (life-size) was from Moulmein.

54. **Barbus punctatus**, Plate CXLIV, fig. 5.

Systomus conchonius, Jerdon, Madr. J. L. and Sc. 1849, p. 317 (not *Cyprinus conchonius*, H. B.)
Puntius punctatus, Day, Proc. Zool. Soc. 1865, p. 302, and Fishes of Malabar, p. 214, pl. vii, f. 1.
Putter perlee, Mal.

B. iii, D. 11($\frac{3}{8}$), P. 15, V. 9, A. 7($\frac{2}{5}$), C. 18, L. l. 23-24, L. tr. 5/5.

Length of head $5\frac{1}{4}$, of caudal $4\frac{1}{2}$ to 5, height of body 3 to $3\frac{1}{2}$ in the total length. *Eyes*—diameter $2\frac{1}{2}$ in the length of head, 1/2 a diameter from end of snout, and 1 diameter apart. Interorbital space flat. Dorsal profile more convex than that of the abdomen. *Fins*—dorsal fin commences over the ventral, and midway between end of snout and base of the caudal, its upper border slightly concave, its last undivided ray osseous, strong, serrated, and about as long as the head: the fin 2/3 as high as the body. Caudal forked. *Lateral-line*—complete, 3 rows of scales between it and the base of the ventral fin: 8 rows before the dorsal fin. Free portion of the tail as high as long. *Colours*—olive-green superiorly, becoming white on the abdomen. A diffused black spot on the twentieth and twenty-first scales of the lateral-line. The anterior half of the third or fourth scale from the opercle, in the row next below the lateral-line, black. Fins yellowish, dorsal and anal tipped with orange. Dorsal with two rows of black spots, and in Malabar examples a short intermediate one anteriorly. In some specimens there is a light edge round the caudal blotch, and a silvery band along the sides.

Habitat.—Malabar and Coromandel coast. It does not appear to exceed 3 inches in length.

55. **Barbus gelius**, Plate CXLV, fig. 3.

Cyprinus gelius and *canius*, Ham. Buch. Fish. Gang. pp. 320, 390; Cuv. and Val. xvi, pp. 396, 397.
Systomus gelius and *canius*, McClell. Ind. Cyp. pp. 286, 287, 386, 387, pl. 44, f. 4 and 6 (from Ham. Buch. MSS.); Bleeker, Beng. pp. 60 and 129.
Barbus gelius, Günther, Catal. vii, p. 154; Day, Proc. Zool. Soc. 1869, p. 374.
Cutturpoh, Ooriah: *Gili pungti*, Beng.

B. iii, D. 10-11($\frac{2-3}{8}$), P. 15, V. 9, A. 8($\frac{3}{5}$), C. 19, L. l. 23-24, L. tr. 4/5.

Length of head $4\frac{1}{4}$ to $4\frac{1}{2}$, of caudal 4, height of body 3 to $3\frac{1}{2}$ in the total length. *Eyes*—diameter $2\frac{1}{2}$ in length of head, 1/2 a diameter from end of snout, 1 diameter apart. Third suborbital bone broad. Dorsal profile rather elevated. *Barbels*—absent. *Fins*—dorsal arises slightly in advance of the ventrals, its osseous ray is strong, rather coarsely serrated, and as long as the head excluding the snout, the fin 2/3 as high as the body: caudal deeply forked. *Lateral-line*—incomplete, ceasing after 5 or 6 scales: 3 rows of scales between lateral-line and base of ventral fin: 8 rows before the dorsal fin. *Colours*—reddish brown, with a black band over the tail a little anterior to the base of the caudal fin, and another less distinct behind the base of that fin. A silvery band along the side. The peritoneum being black appears like an irregular dark blotch. A black spot passes across the base of the anterior half of the dorsal, extending one-third the distance up the rays. A black band over the base of the anal, highest in front. Occiput also black.

Habitat.—Ganjam, Orissa, Bengal, and Assam. It attains at least 2 inches in length. The example figured (life-size) was from Debrooghur in Upper Assam.

56. **Barbus phutunio**, Plate CXLV, fig. 4.

Cyprinus phutunio, Ham. Buch. Fish. Gang. pp. 319, 390; Cuv. and Val. xvi, p. 395.
Systomus leptosomus, McClell. Ind. Cyp. pp. 287, 387, pl. 44. f. 2, (from Ham. Buch. MSS.)
Systomus phutunio, Bleeker, Bengal, pp. 62 and 128, (not Cyp. and Cobit. Ceylon, 1864-65, p. 12, t. iv, f. 4.)
Barbus phutunio, Günther. Catal. vii, p. 154; Day, Proc. Zool. Soc. 1869, p. 375.
Kudji-kerundi, Ooriah; *Phutuni pungti*, Beng.

B. iii, D. 10-11($\frac{2-3}{8}$), P. 15, V. 9, A. 8($\frac{3}{5}$), C. 19, L. l. 20-23, L. tr. 8-10.

Length of head 4 to $4\frac{2}{3}$, of caudal 4, height of body 3 to $3\frac{1}{4}$ in the total length. *Eyes*—diameter $2\frac{1}{2}$ in the length of head, 1/2 to 3/4 of a diameter from end of snout, 1 diameter apart. Dorsal profile more elevated than the abdominal. Mouth small. *Barbels*—absent. *Fins*—dorsal osseous ray serrated, the serratures often becoming indistinct in the adult: the fin commences opposite the ventrals, and midway between the end of the snout and the base of the caudal, which latter is rather deeply forked. *Lateral-line*—incomplete, only extending along three or four scales: from it to the base of the ventral are 3 rows: 9 rows before the dorsal fin. *Colours*—reddish-brown, with a black band passing from the back to opposite the middle of the pectoral fin: a second from the back to the posterior end of the base of the anal: two other lighter bands pass downwards, one from the anterior, the other from the posterior extremity of the dorsal. A dark band down the centre of the dorsal, another at the base of the caudal. The adult in its colours becomes very similar to *B. punctatus*, the pectoral band decreases in size, whilst that on the dorsal fin breaks up into spots.

Habitat.—Ganjam, Orissa and through Bengal and Burma, attaining 3 inches in length.

57. **Barbus Cumingii.**

Puntius phutunio, Bleeker, Cyp. and Cobit. Ceylon, 1864, p. 12, t. iv, f. 4 (not H. Buch.)
Barbus cumingii, Günther, Catal. vii, p. 155.

B. iii, D. 11($\frac{3}{8}$), P. 15, V. 9, A. 8($\frac{3}{5}$), C. 19, L. l. 21, L. tr. $3\frac{1}{2}/3\frac{1}{2}$.

Length of head 5, of caudal $4\frac{1}{4}$, height of body 3 in the total length. *Eyes*—diameter $2\frac{3}{4}$ in the length of head, 2/3 of a diameter from the end of snout, and 1 apart. Dorsal profile more convex than that of the abdomen. Mouth small. Suborbital bones very deep. *Barbels*—absent. *Fins*—the dorsal commences midway between the end of the snout and base of the caudal fin, and opposite the insertion of the ventral, its last undivided ray is rather weak, osseous, and finely serrated. Pectoral reaches the ventral. Anal rather small. Caudal deeply forked. *Lateral-line*—incomplete, ceasing after 4 scales: 3 rows of scales between the lateral-line and base of the ventral fin: and 9 before the base of the dorsal. *Colours*—two dark vertical bands, one descending to the pectoral fin: the second across the free portion of the tail. Each scale with a silvery vertical streak (? a post-mortem appearance.)

Habitat.—Ceylon attaining to at least 2 inches in length.

58. **Barbus nigrofasciatus**, Plate CXLIV, fig. 6.

Günther, Catal. vii, p. 155.

B. iii, D. 11($\frac{3}{8}$), P. 15, V. 9, A. 7($\frac{2}{5}$), C. 19, L. l. 20-21.

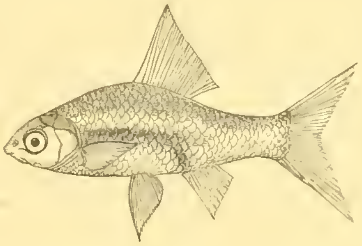
Length of head $4\frac{3}{4}$, of candal $3\frac{2}{3}$, height of body $2\frac{2}{3}$ in the total length. *Eyes*—diameter 3 to $3\frac{1}{2}$ in the length of head, 1 diameter from end of snout and also apart. Body oval, strongly compressed: interorbital space convex. Mouth small, upper jaw the longer. *Barbels*—absent. *Fins*—dorsal lower than the body, it commences opposite the ventrals, its osseous ray is strong and finely serrated. Caudal deeply forked. *Lateral-line*—complete, 3 rows of scales between it and the base of the ventrals. *Colours*—reddish, with a black band passing from eye to eye: body with three vertical black bands, the first from the back to the middle of the pectoral fin, the second from the base of the dorsal to behind the base of the ventral, and the third across the free portion of the tail. Dorsal, anterior portion of ventral and outer edge of anal black. The bands are not in exactly the same position in all specimens.

Habitat.—Southern Ceylon. The example figured (life-size) is from a specimen in the British Museum.

59. Barbus guganio.

Cyprinus guganio, Ham. Buch. Fishes, Ganges, pp. 338, 339, 392.
Leuciscus guganio, Cuv. and Val. xvi, p. 445; Bleeker, Beng. p. 68.
Gugani, Beng.

B. iii, D. 10($\frac{2}{8}$), P. 12, V. 9, A. 7.



Cyprinus Guganio (*H. B.'s MS. figure.*)

"Head oval, small, blunt and dotted. Mouth small. The jaws protrude in opening, the upper is the longest. * * The eyes are far forwards on the sides of the head and large." *Fins*—the dorsal is near the middle, its osseous ray is strong and serrated. *Scales*—large and firmly adherent. *Lateral-line*—incomplete. *Colours*—the back dotted.

Habitat.—Gangetic provinces and Assam. It scarcely exceeds an inch and a half in length. This species is evidently allied to *Barbus ambassis*, p. 576.

b. Osseous dorsal ray entire.

60. Barbus stigma, Plate CXLI, fig. 5.

Cyprinus sophore, Ham. Buch. Fish. Ganges, plate xix, fig. 86 (not pp. 310, 389.)
Systomus sophore, McClell. Ind. Cyp. pp. 285, 382; Bleeker, Beng. p. 62; Jerdon, M. J. L. and S. 1849, p. 316 (not Ham. Buch.)
Leuciscus stigma and *sulphureus*, Cuv. and Val. xvii, pp. 93, 96, pl. 489; Bleeker, Beng. p. 68; Jerdon, l. c. p. 317.
Leuciscus Duvaucelii, Cuv. and Val. xvii, p. 95, pl. 491; Bleeker, Beng. p. 66.
Cyprinus sophore, Cuv. and Val. xvi, p. 388.
Systomus Duvaucelii, Bleeker, Prod. Cyp. p. 278.
Barbus Duvaucelii, Günther, Catal. vii, p. 151.
Puntius modestus, Kner, Novara Fische, p. 348, t. 15, f. 3.
Barbus sophore and *modestus*, Günther, Catal. vii, pp. 152, 156.
Barbus stigma, Day, Proc. Zool. Soc. 1868, p. 198, 1869, p. 375.
Chadu-perigi, Tel.: *Patia-kerundi*, Ooriah: *Katcha-karawa* and *Pottiah*, Hin.: *Katch-karawa*, Can.: *Nga-kkoon-ma*, Burm.

B. iii, D. 11-12($\frac{3}{8-9}$), P. 17, V. 9, A. 8($\frac{3}{5}$), C. 19, L. l. 23-26, L. tr. 4½-5/5, Vert. 15/14.

Length of head 5, of caudal 5, height of body 3½ to 3¾ in the total length. *Eyes*—diameter 3½ to 4 in length of head, 1/2 to 1 diameter from end of snout, 1½ to 2 diameters apart. Dorsal profile much more convex than that of the abdomen, and a little concave over the occiput. Upper jaw slightly the longer. Lower labial fold interrupted. *Barbels*—absent. *Teeth*—pharyngeal, crooked, 5, 3, 2/2, 3, 5. *Fins*—dorsal 1/2 to 2/3 as high as the body, its last undivided ray osseous, rather weak or of moderate strength, entire, as long as the head without the snout, or even less; it commences rather in advance of the insertion of the ventral, and midway between the end of the snout and the base of the caudal. *Lateral-line*—complete, 3 to 3½ rows of scales between it and the base of the ventral fin: 8 to 9 rows before the dorsal fin. Occasionally in the N.W. Provinces and Bengal specimens occur with l. l. 27. Free portion of tail as high as long. *Colours*—silvery, with a scarlet lateral band at some seasons, and a dark mark across the base of the middle dorsal rays, this last being occasionally absent. A round black blotch, more or less distinct, at the root of the caudal fin.

The type of *L. Duvaucelii* is still in good preservation at Paris, and is this species.

Habitat.—Sind, throughout India and Burma as high as Mandalay. As food it is bitter. In January, 1868, I found 1850 developed ova in one female fish at Madras. It attains at least 5 inches in length.

61. Barbus chrysopterus, Plate CXLIII, fig. 6.

Systomus chrysopterus, McClell. Ind. Cyp. pp. 285, 383; Bleeker, Beng. p. 60.

Barbus chrysopterus, Günther, Catal. vii, p. 152.
Pottiah, Punj.: *Durru*, Sind.

B. iii, 11($\frac{3}{8}$), P. 17, V. 9, A. 7($\frac{2}{5}$), C. 19, L. l. 23-25, L. tr. 5/5.

Length of head 5, of caudal $4\frac{1}{2}$, height of body 3 in the total length. *Eyes*—diameter 3 to $3\frac{1}{2}$ in length of the head, 3/4 to 1 diameter from end of snout. Upper profile slightly concave over the nape, rising considerably to the base of the dorsal fin, and much more convex than that of the abdomen. Body compressed. Third suborbital bone very narrow. Mouth narrow, horse-shoe shaped, the upper jaw very slightly the longer when the mouth is closed. *Fins*—dorsal arises over or slightly in advance of the ventral, and midway between the end of the snout and the base of the caudal, its smooth osseous ray is not strong and as long as the head without the snout; upper margin of the dorsal fin slightly concave, its height is only slightly above one-half of that of the body. The pectoral extends to the ventral, and the latter to the anal. Lower caudal lobe slightly the longer. *Lateral-line*—complete, $3\frac{1}{2}$ rows of scales between it and the base of the ventral fin: 9 rows before the dorsal fin. *Colours*—dull silvery, darkest along the back, and each scale having a dark base formed by fine black dots. Dorsal, ventral, and anal fins generally stained with black spots at their extremities, but in some specimens only the anal. A dark mark at the base of 3rd to 7th divided dorsal rays, sometimes a dark mark at base of the tail.

Habitat.—Assam, Bengal, N. W. Provinces, Punjab and Sind. The specimen figured (life-size) was from Roorkee.

62. Barbus thermalis.

Leuciscus thermalis, Cuv. and Val. xvii, p. 94, pl. 490.
Barbus thermalis, Günther, Catal. vii, p. 143 (not synon.).

B. iii, D. 11 ($\frac{3}{8}$), P. 15, V. 9, A. 8 ($\frac{3}{5}$), C. 19, L. l. 24, L. tr. $5\frac{1}{2}/5\frac{1}{2}$.

Length of head $4\frac{1}{4}$, of caudal $4\frac{1}{4}$, height of body $3\frac{1}{3}$ in the total length. *Eyes*—diameter $3\frac{1}{2}$ in length of head, 1 diameter from end of snout. Dorsal profile more convex than the abdominal. Body very compressed. Jaws of about equal length: interorbital space convex. *Barbels*—absent. *Fins*—dorsal commences nearer the end of snout than the base of caudal fin, it is only two-thirds as high as the body, its osseous ray moderately strong, rather longer than the head without the snout. *Lateral-line*—incomplete, ceasing after eight scales. *Colours*—silvery, a round black finger mark on either side of the free portion of the tail anterior to the base of the caudal fin, and a second at the base of the first few dorsal rays.

Habitat.—From a hot spring in Ceylon; attaining at least 3 inches in length. This description is from the type specimen which is at Paris.

63. Barbus terio, Plate CXLIV, fig. 3.

Cyprinus terio, Ham. Buch. Fish. Gang. pp. 313, 389; Cuv. and Val. xvi, p. 398.
Systomus gibbosus, McClell. Ind. Cyp. pp. 286, 385, pl. 44, f. 7. (from Ham. Buch. MSS.)
Systomus terio, Bleeker, Beng. p. 62.
Barbus terio, Günther, Catal. vii, p. 153; Day, Proc. Zool. Soc. 1869, p. 376.
Kakachia-kerundi, Ooriah: *Teri pungti*, Beng.

B. iii, D. 11($\frac{3}{8}$), P. 15, V. 9, A. 7($\frac{2}{5}$), C. 19, L. l. 22-23, L. tr. 5/5.

Length of head 4 to $4\frac{1}{2}$, of caudal 4, height of body 3 in the total length. *Eyes*—diameter $2\frac{3}{4}$ to 3 in length of head, 3/4 to 1 diameter from end of snout, $1\frac{1}{4}$ diameters apart. Interorbital space flat. Body compressed, dorsal profile more convex than that of the abdomen, there being a considerable rise from the snout to the base of the dorsal fin. Upper jaw slightly the longer. *Barbels*—absent. *Fins*—dorsal arises slightly in advance of the ventrals, and midway between the end of snout and base of the caudal, its last undivided ray is osseous, entire, moderately or very strong, and nearly as long as the head: the fin is almost as high as the body below it. *Lateral-line*—incomplete, ceasing after 3 or 4 scales: 3 rows between the lateral-line and base of the ventral fin: 9 rows in front of the dorsal fin. *Colours*—silvery, greenish along the back, and each scale having a number of fine black spots most numerous at the anterior margin. A large black blotch in the middle of the side over the posterior extremity of the anal, which is sometimes extended in the median line as far as the tail. A very indistinct black blotch (most apparent in the immature) exists under the posterior extremity of the dorsal passing downwards to the middle of the fish. Fins yellowish, their margins stained with black, the dorsal having a median band. In some specimens there is a dark mark at the bases of the scales.

Habitat.—Orissa, Bengal to the Punjab. It attains 3 or 4 inches in length. The specimen figured (life-size) was from Orissa.

c. *Last undivided dorsal ray articulated, or if osseous very weak.*

64. Barbus Punjaubensis, Plate CXLV, fig. 2.

Day, J. A. S. of B. 1871, p. 334.

B. iii, D. 11($\frac{3}{8}$), V. 9, A. 7($\frac{2}{5}$), C. 19, L. l. 43, L. tr. 8/?.

Length of head 2/11, of caudal 1/4, height of body 2/7 of the total length. *Eyes*—rather large, situated in the anterior half of the head, 1/3 of a diameter from end of snout. Mouth small, horse-shoe shaped, with the upper jaw slightly overhanging the lower. Abdominal profile more convex than that of the back. *Barbels*—absent. *Fins*—dorsal two-thirds as high as the body below it, arising midway between the snout and the base of the caudal fin, its last undivided ray is weak and articulated. Caudal deeply forked, with pointed lobes. *Lateral-line*—incomplete, 14 rows of scales before the base of the dorsal fin. *Colours*—silvery, with a burnished silvery stripe along the side, and a black spot at the base of the caudal fin. Two first dorsal rays and intermediate membrane deep black.

Very similar in appearance to *B. ambassis*, but at once distinguished by the character of its last undivided dorsal ray, which is articulated, and not osseous and serrated.

Habitat.—Sind, Ravi river at Lahore, also Jubbulpore; it is a small species, attaining about 2 inches in length. Nearly all my specimens were spoiled before I was able to put them into spirit.

65. Barbus unimaculatus, Plate CXLV, fig. 5 *(twice natural size)*.

Systomus unimaculatus, Blyth, J. A. S. of Bengal, 1860, p. 159; Day, Proc. Zool. Soc. 1869, p. 557.

B. iii, D. 11 ($\frac{3}{8}$), P. 11, V. 8, A. 7 ($\frac{2}{5}$), C. 19, L. l. 24-25, L. tr. $4\frac{1}{2}/4\frac{1}{2}$.

Length of head $3\frac{1}{2}$, height of body 3 in the total length. *Eyes*—diameter 3 in the length of head, 1 diameter from the end of snout and also apart. Mouth small, extending half the distance to below the orbit. Lower labial fold interrupted. *Barbels*—absent. *Fins*—dorsal with the last undivided ray osseous, entire, weak, and nearly as long as the head: it commences midway between the snout and the base of the caudal fin. *Lateral-line*—incomplete, becoming lost opposite the posterior extremity of the dorsal fin: 3 rows of scales between it and the base of the ventral fin: 9 rows before the dorsal fin. *Colours*—silvery, a black mark at the base of each dorsal ray.

Habitat.—A number of fry up to $1\frac{8}{10}$ inches in length from the Sitang river in Burma are in the Calcutta Museum; what they would be, when adults, it is difficult to determine, but, as the lateral-line is incomplete, they probably never would grow to large fish. The species is very similar to *Barbus thermalis*, C.V. (not Günther), but its head is a little longer, whilst the latter is from Ceylon.

66. Barbus Waageni, Plate CXLIV, fig. 4.

Day, Journal Asiatic Society of Bengal, xli, pt. ii, 1872, p. 325.

B. iii, D. 10-11 ($\frac{2-3}{8}$), P. 15, V. 9, A. 7 ($\frac{2}{5}$), C. 20, L. l. 23, L. tr. 4/7.

Length of head 4, of caudal 4 to $4\frac{1}{2}$, height of body 3 to $3\frac{1}{3}$ in the total length. *Eyes*—diameter $3\frac{3}{4}$ to 4 in the length of the head, 3/4 to 1 diameter from end of snout, and $1\frac{1}{4}$ apart. Dorsal profile considerably elevated. Height of the head equals its length: its upper surface flat: snout obtuse. Upper jaw the longer. Lower lip very thick, the transverse fold interrupted. *Barbels*—absent. *Fins*—dorsal 1/2 as high as the body below it, it commences nearer the base of the caudal fin than the front end of the snout, its upper edge is straight: last undivided ray articulated. Pectoral as long as the head excluding the snout. Caudal forked. *Lateral-line*—incomplete, ceasing about the seventh scale: $4\frac{1}{2}$ rows between it and the base of the ventral fin: 12 rows anterior to the dorsal fin. Caudal peduncle as high at its base as it is long. *Colours*—silvery, darkest superiorly: a dark blotch on the side of the tail on about the seventeenth and eighteenth rows of scales.

Habitat.—Chua Saidar Shah in the Punjab Salt range. This species was received from Dr. Waagen, after whom I named it.

67. Barbus cosuatis, Plate CXLIV, fig. 1.

Cyprinus cosuatis, Ham. Buch. Fish. Gang. pp. 338, 392; Cuv. and Val. xvi, p. 444.
Systomus malacopterus, McClell. Ind. Cyp. pp. 287, 386, pl. 44, f. 9 (from H. B. MSS.).
Rohtee pangut, Sykes, Trans. Zool. Soc. ii, p. 365.
Leuciscus cosuatis, Bleeker, Beng. pp. 66, 139.
Barbus cosuatis, Günther, Catal. vii, p. 157.
Koswati, Beng.

B. iii, D. 11 ($\frac{3}{8}$), P. 13, V. 9, A. 7 ($\frac{2}{5}$), C. 19, L. l. 22, L. tr. 3/3.

Length of head 4 to $4\frac{1}{4}$, of caudal 4, height of body $3\frac{1}{3}$ in the total length. *Eyes*—diameter $2\frac{1}{2}$ to $2\frac{3}{4}$ in length of head, 1/2 a diameter from end of snout, 1 diameter apart. A considerable rise to base of dorsal fin. Mouth small: upper jaw slightly the longer. No lower labial fold. *Fins*—dorsal without any osseous ray, it commences midway between the end of the snout and the base of the caudal fin, its upper edge is oblique and its height exceeds that of the body below it. *Lateral-line*—incomplete, the row of scales on which it is situated is larger than the others, 2 rows between it and the base of the ventral fin: 8 or 9 rows before the base of the dorsal fin. *Colours*—silvery, the scales having dark bases: a black band along the top of the dorsal, another across its middle also on the anterior anal rays.

Habitat.—Bengal, through the N. W. Provinces, the Deccan and Bombay, and down the Western coast as low as Cottayam in Travancore. It attains 2 or 3 inches in length. The specimen figured (life-size) was from Jubbulpore.

68. Barbus vittatus, Plate CXLIV, fig. 2.

Puntius vittatus, Day, Proc. Zool. Soc. 1865, p. 303, Fish. Malabar, p. 215, pl. 13, f. 1.
Barbus vittatus, Günther, Catal. vii, p. 156.
Puntius sophore, Kner, Novara Fische, p. 347 (not Ham. Buch.).
Kooli, Hind.

B. iii, D. 10 ($\frac{2}{8}$). P. 12, V. 9, A. 7 ($\frac{2}{5}$), C. 20, L. l. 20-22, L. tr. 3/4.

Length of head 4 to $4\frac{1}{2}$, of caudal 5, height of body $3\frac{1}{2}$ in the total length. *Eyes*—diameter from 1/2 to 1/3 in the adult of the length of head, 2/3 of a diameter from end of snout, $1\frac{1}{2}$ diameters apart. Dorsal and abdominal profiles about equally convex. Mouth small. *Barbels*—absent. *Fins*—last undivided dorsal ray articulated, weak, and entire: the fin commences somewhat in advance of the ventrals, and midway between the snout and the base of the caudal fin, the latter being forked. *Lateral-line*—incomplete, ceasing after about 5 scales, 3 rows between it and the base of the ventral fin: 8 rows before the dorsal fin. *Colours*—silvery, generally with four black spots in the adult, one just before the dorsal, one below its posterior margin, another at the base of the caudal, and a fourth at the base of the anal. The dorsal has a vertical black streak, and a black tip with orange markings. In the immature the colours vary; when the fish is about eight-tenths of an inch long, a vertical stripe begins to show itself in the posterior third of the dorsal fin, the summit of which also becomes edged with black, whilst there are some irregular orange markings: in very young specimens the line of demarcation between the green of the back, and the silvery abdomen, appears like a white band running from the eye to the middle of the tail. In some specimens one or more of the spots are absent.

Habitat.—Mysore, Madras, Wynaad, Malabar, Ceylon, and Cutch, attaining $1\frac{1}{2}$ inches in length. The specimen figured (life-size) was from Madras.

69. Barbus filamentosus.

Leuciscus filamentosus, Cuv. and Val. xvii. p. 95, pl. 492; Bleeker, Beng. p. 68.
Systomus assimilis, filamentosus and *Madraspatensis*, Jerdon, Madr. Journ. Lit. and Sc. xv, pp. 318, 319.
Puntius filamentosus, Day, Fish. Malabar, p. 215.

B. iii, D. 11($\frac{3}{8}$), P. 15, V. 9, A. 7($\frac{2}{5}$), C. 19, L. l. 21, L. tr. 4/4.

Length of head 5, of caudal 4, height of body 3 to $3\frac{1}{2}$ in the total length. *Eyes*—diameter $3\frac{1}{2}$ in the length of head, 2/3 to 1 diameter from end of snout, $1\frac{3}{4}$ apart. Interorbital space nearly flat. Body strongly compressed and elevated. Generally large pores over the snout. *Barbels*—absent. *Fins*—dorsal arises slightly nearer snout than base of the caudal fin, its last undivided ray is osseous, smooth, and feeble, whilst the divided ones are all more or less elongated in the adult. *Lateral-line*—complete, 2 rows of scales between it and the base of the ventral: 7 rows before the dorsal fin. *Colours*—silvery, each scale having a metallic green edging, whilst a more or less distinct black blotch exists on the lateral-line, on the fourteenth and fifteenth scales, and before the base of the caudal fin. A very curious change occurs in this fish immediately after death, the whole of its body becoming scarlet. Caudal red, tipped with black, and edged with white: dorsal and ventral nearly black.

Habitat.—Western coast and Southern India, attaining 6 inches in length. It is so similar to *B. Mahecola* (except in wanting barbels) that I have not figured it.

70. Barbus puntio, Plate CXLV, fig 6.

Cyprinus puntio, Ham. Buch. Fish. Ganges, pp. 318, 389.
Systomus puntio, Bleeker, Beng. p. 62.
Barbus puntio, Günther, Catal. vii, p. 154; Day, Proc. Zool. Soc. 1870, p. 100.

B. iii, D. 11 ($\frac{3}{8}$), P. 15, V. 9, A. 7 ($\frac{2}{5}$), C. 21, L. l. 23, L. tr. 5/4.

Length of head 4 to $4\frac{1}{3}$, of caudal $3\frac{1}{2}$, height of body 3 to $3\frac{1}{4}$ in the total length. *Eyes*—diameter 2/5 of length of head, 1/2 to 3/4 of a diameter from end of snout, 1 diameter apart. Dorsal profile considerably elevated. Mouth small. *Barbels*—absent. *Fins*—last undivided dorsal ray osseous and entire, the fin commences rather in advance of the ventrals, and midway between the anterior margin of the orbit and the base of the caudal fin, the latter deeply forked. *Lateral-line*—only extending distinctly for a few scales, but very indistinctly to the base of the caudal fin: $2\frac{1}{2}$ rows between it and the base of the ventral fin: 8 rows before the dorsal fin. *Colours*—silvery, a wide black band encircles the free portion of the tail, and includes the tip of the anal fin. Dorsal orange tipped with black.

Habitat.—Bengal and British Burma. It only attains about 3 inches in length.

B. Dorsal fin commencing very distinctly posterior to the ventrals, but not extending to above the anal, which last is short or of moderate length (5 to 11 branched rays).

Genus, 17—Nuria, *Cuv. and Val.*

Esomus, Swainson.

Abdomen rounded. Pseudobranchiæ present: mouth narrow, directed obliquely upwards, suborbitals broad.

Barbels four, the rostral shorter than the maxillary pair: pharyngeal teeth crooked, pointed, 5/5. Dorsal fin without osseous ray, and with few branched ones, it is inserted posterior to the ventral, but does not extend to over the anal, the latter having but few or a moderate number of branched rays: scales of moderate size. Lateral-line, when present, passing to the lower half of the base of the caudal fin. Gill-rakers short.

Geographical distribution.—Continent of India, Ceylon, Burma, and the Nicobars.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Nuria danrica*, D. 2/6, A. 3/5, L. l. 30-34. Lateral-line present or absent. A black lateral band. India, Ceylon, Burma, and Nicobars.

1. Nuria danrica, Plate CXLV, fig. 7 (var. *Malabarica*) and fig. 8 (var. *alta*).

Cyprinus danrica, sutiha, and *jogia*, Ham. Buch. Fish. Ganges, pp. 325, 327, 390, 391, pl. 16, f. 88; Cuv. and Val. xvi, pp. 404, 405, 408.

Perilampus recurvirostris, macrourus, and *thermophilus*, McClell. Ind. Cyp. pp. 290, 291, 398, 399, pl. 46, f. 2 (from H. B.'s MS.) and 3.

Nuria thermoicos and *thermophilos*, Cuv. and Val. xvi, pp. 238, 240; Bleeker, Beng. p. 62.

Esomus vittatus, Swainson, Fishes, ii, p. 285.

Leuciscus barbatus, Jerdon, M. J. L. and Sc. 1849, p. 322.

Nuria danrica, Bleeker, Beng. en Hind. pp. 62, 130; Günther, Catal. vii, p. 200; Day, Proc. Zool. Soc. 1869, p. 558.

Nuria alta, Blyth, J. A. S. of B. 1860, p. 162.

Esomus danrica, Bleeker, Atl. Ich. Cypr. p. 32.

Esomus thermoicos, Kner, Novara Fische, p. 363.

Esomus Malabaricus and *Madraspatensis*, Day, Proc. Zool. Soc. 1867, pp. 299, 300.

Danrica and *Jongja*, Beng.: *Kurriah dahwiee*, Hind.: *Soomarah*, Hind. (N. W. P.): *Chid-dül-lu*, Punj.: *Mola* and *Mah-wa*, N. W. Provinces: *Nga-zin-byoon*, Burmese.

B. iii, D. 8 ($\frac{2}{6}$), P. 15, V. 9, A. 8 ($\frac{3}{5}$), L. l. 30-34, L. tr. 5-6/3.

Length of head $5\frac{1}{4}$ to $5\frac{1}{2}$, of caudal 5 to $5\frac{1}{2}$, height of body $5\frac{1}{2}$ in the total length. *Eyes*—diameter $3\frac{1}{4}$ to $3\frac{1}{2}$ in the length of head, 1 diameter from end of snout and apart. *Barbels*—the rostral not so long as the head, the maxillary ones extend to the base of the ventral or even to that of the caudal fin. *Fins*—the dorsal commences nearer the base of the caudal than the head: pectoral varies with age, being generally proportionately longer in the immature: sometimes the anal fin is higher than the dorsal, especially in the immature. *Lateral-line*—usually present, entire: 2 rows of scales between it and the base of the ventral: 18 before the dorsal fin. *Colours*—a broad black lateral band, sometimes absent.

Variety *Nuria alta*, Blyth, Plate cxlv, fig. 8, is a Burmese form, which differs in the height of its body, being $4\frac{1}{2}$ (instead of $5\frac{1}{2}$) in the total length, and its anal fin being a little lower.

Variety *Nuria Malabarica*, Day, Plate cxlv, fig. 7, is a form found along the coasts of India, Burma, and the Nicobars. It is distinguished by the entire absence of the lateral-line, but is otherwise exactly similar to the type.

Habitat.—India, Ceylon, Burma and the Nicobars. Dr. Cumberland found it in a hot stream of 112° Fahr. at Pooree, M. Regnaud in a hot stream at Cannia in Ceylon: it attains 5 inches in length.

Genus, 18—Rasbora, *Bleeker*.

Leuciscus, sp. Cuv. and Val.: *Megarasbora*, Günther.

Abdomen rounded. Pseudobranchiæ present. Cleft of mouth oblique, lower jaw slightly prominent, having one central and on either side a lateral prominence, fitting into corresponding emarginations in the upper jaw. Barbels two (rostral), or none. Eyes with free lids. Pharyngeal teeth 5, 3 or 4, 2/2, 3 or 4, 5. *Dorsal fin without any osseous ray and few branched ones, inserted posterior to the origin of the ventral but not extending to above the anal, which latter is short. Scales large, or of moderate size. Lateral-line concave, continued to the middle or lower half of the caudal fin. Gill-rakers short and lanceolate.*

Geographical distribution.—Africa, India, Ceylon, Burma, to the Malay Archipelago.

SYNOPSIS OF SPECIES.

A. *Barbels present (Megarasbora).*

1. *Rasbora elanga*, D. 2/7, A. 2/5, L. l. 40-44. Bengal, Assam and Burma.

B. *Barbels absent (Rasbora).*

2. *Rasbora daniconius*, D. 2/7, A. 2-3/5, L. l. 30-34. Mostly a black lateral stripe. Continent of India, Ceylon and Zanzibar.

3. *Rasbora Buchanani*, D. 2/7, A. 2/5, L. l. 26-29. Caudal black edged. From Mysore throughout India, Assam and Burma.

A. *Barbels present (Megarasbora).*

1. Rasbora elanga, Plate CXLVI, fig. 1.

Cyprinus elanga, Ham. Buch. Fish. Ganges, pp. 281, 386; Cuv. and Val. xvi, p. 415.
Leuciscus dystomus, McClell. Ind. Cyp. pp. 292, 406, pl. 56, f. 4.
Leuciscus elanga, Bleeker, Beng. p. 66.
Rasbora elanga, Günther, Catal. vii, p. 198.
Dahwiee, Hind.; *Elang*. Assam.

B. iii, D. 9($\frac{2}{7}$), P. 15, V. 8-9, A. 7($\frac{2}{5}$), C. 19, L. l. 40-44, L. tr. 7-8/6.

Length of head 5 to $5\frac{1}{2}$, of caudal 6, height of body $4\frac{1}{2}$ to 5 in the total length. *Eyes*—diameter from 3 to 4 in the length of head, 1 diameter from end of snout, $1\frac{1}{2}$ diameters apart. Head pointed, its greatest width equalling 1/2 its length, jaws of equal length, prominences and emarginations well-defined. *Barbels*—one pair of short rostral ones. *Teeth*—pharyngeal, 5, 4, 2/2, 4, 5. *Fins*—dorsal commences midway between the posterior margin of the orbit and the base of the caudal fin. The pectoral, which is nearly as long as the head, does not reach the ventral. Caudal forked. *Lateral-line*—$1\frac{1}{2}$ to 2 rows of scales between it and base of ventral fin: 14 rows before the base of the dorsal fin. *Colours*—silvery, with sometimes a leaden-coloured band along the upper portion of the side.

Habitat.—Bengal, Assam and Burma: attaining at least 8 inches in length.

B. *Barbels absent (Rasbora as restricted).*

2. Rasbora daniconius, Plate CXLVI, fig. 2, and fig. 3 (var. *R. Neilgherriensis*).

Cyprinus daniconius and *anjana*, Ham. Buch. Fish. Ganges, pp. 327, 329, 391, pl. 15, f. 89; Cuv. and Val. xvi, pp. 435, 436.
Leuciscus anjana, daniconius, rasbora, and *lateralis*, McClell. Ind. Cyp. pp. 292, 405, 407; Bleeker, Beng. pp. 66, 68.
Leuciscus dandia, Cuv. and Val. xvii, p. 309.
Leuciscus Malabaricus, Caverii and *flavus*, Jerdon, M. J. L. and S. 1849, pp. 320, 321.
Rasbora dandia, Bleeker, Cyp. and Cobit. Ceylon, 1864, p. 18, pl. I, f. 3.
Rasbora Malabarica, Day, Mal. Fish. p. 220.
Rasbora woolaree and *Neilgherriensis*, Day, Proc. Zool. Soc. 1867, p. 298; Günther, Catal. vii, p. 197.
Opsarius daniconius, Kner, Novara Fische, p. 358.
Rasbora daniconius, Günther, Catal. vii, p. 194.
Mile-lo-ah, N.W. Prov.: *Chin-do-lah, Raan-kaal-le* and *Charl*, Punj.: *Neddean jubbu*, Canarese: *Ovaree candee*, Tamil.: *Kokanutchee*, Mal.: *Jilo*, Ooriah, *Danikoni* and *Angjani*, Beng.: *Doh-ni-ko-nah*, Assam: *Nga-doung-zee* and *Nga-nauch-youn*, Burm.: *Jonir*, Cutch.

B. iii, D. 9($\frac{2}{7}$), P. 15, V. 9, A. 7($\frac{2}{5}$), C. 19, L. l. 31-34, L. tr. $4\frac{1}{2}$/5, Vert. 18/14.

Length of head $4\frac{1}{2}$ to 5, of caudal 5, height of body $4\frac{1}{2}$ to $5\frac{1}{4}$ or even 6 in the total length. *Eyes*—diameter $3\frac{2}{3}$ to 4 in the length of head, 1 diameter from end of snout and also apart. The greatest width of the head equals its postorbital length. Prominences and emarginations on jaws well defined. Cleft of mouth extends to beneath anterior margin of orbit. *Teeth*—pharyngeal, curved, sharp, 5, 3, 2/2, 3, 5. *Fins*—dorsal 2/3 the height of the body, it commences nearer the base of the caudal than the front edge of the snout, and rather nearer origin of ventral than that of anal in some examples, at an equal distance in others. *Lateral-line*—descends very gradually for the depth of 2 rows of scales: 2 rows of scales between it and ventral fin: 14 rows in front of base of dorsal fin. *Colours*—a black band, more or less distinct, passes from the eye to the base of the caudal. Sometimes it only exists just at its termination and thus forms a spot at the side of the base of the tail: or in some young specimens a bright silvery band superiorly edged with yellow is seen along the sides. Caudal occasionally with its lobes tipped with gray.

Dr. Günther considers *Rasbora Einthovenii*, Bleeker, to be identical with this species. *R. Neilgherriensis* appears to be a large variety attaining 8 inches in length, it has usually 34 rows of scales, the same number is seen in many Deccan examples. *R. Zanzibarensis*, Playfair, Fish. Zanzibar, p. 119, pl. xvii, f. 4, shows no appreciable difference from this species.

Habitat.—Continent of India, Ceylon, Burma, Malay Archipelago and Zanzibar, attaining 8 inches in length. It is much more common than *R. Buchanani*.

3. Rasbora Buchanani, Plate CXLV, fig. 10.

Cyprinus rasbora, Ham. Buch. pp. 329, 391, pl. 2, f. 90; Cuv. and Val. xvi, p. 438.
Leuciscus rasbora, McClell. Ind. Cyp. pp. 292, 407; Cantor, Catal. p. 268; Bleeker, Beng. p. 140.
Leuciscus presbyter, Cuv. and Val. xvii, p. 307; Bleeker, Beng. p. 68.
Rasbora Buchanani, Bleeker, Prod. Cyp. p. 451, and Atl. Ich. Cyp. p. 125, pl. 14, f. 3; Günther, Catal. vii, p. 196.
Leuciscus xanthogramme and *microcephalus*, Jerdon, M. J. L. and S. 1849, p. 321.

B. iii, D. 9($\frac{2}{7}$), P. 15, V. 9, A. 7-8($\frac{2}{5-6}$), C. 19, L. l. 26-29, L. tr. $4\frac{1}{2}$/3.

Length of head 5, of caudal 5, height of body 4 in the total length. *Eyes*—diameter $3\frac{1}{2}$ in the length of head, about 1 diameter from end of snout, and rather more apart. Abdominal profile more convex than the dorsal. Prominences on jaws well-developed. *Fins*—dorsal commences nearer the base of the caudal than the snout. *Lateral-line*—concave, 2 rows of scales between it and the base of the ventral fin: 12 rows anterior to the base of the dorsal fin. *Colours*—silvery, a faint streak along the side, caudal usually tipped with black, especially in Burmese examples.

Habitat.—Continent of India, Assam, Burma and Pinang: in India it is most common in the valley of the Ganges and along the Coromandel Coast. It attains 4 or 5 inches in length. The example figured (life-size) was from Moulmein.

Genus, 22—Aspidoparia (*Heckel*) *Bleeker.*

Morara, Bleeker.

Abdomen rounded. Mouth small, inferior, the lower jaw having a sharp crescentic edge destitute of lip. Barbels absent. Suborbital ring of bones of moderate width or broad. Pharyngeal teeth, 4, 4, 2/2, 4. 4, *or* 4, 3/3, 4. *Dorsal fin without osseous and with rather few branched rays, commencing opposite to or behind the origin of the ventrals, but not extending to above the anal, which latter has a moderate number* (10 *to* 12) *of rays. Scales of moderate size. Lateral-line concave, and passing along the lower half of the base of the caudal fin.*

Geographical distribution.—Throughout Bengal, Assam, Bombay, and Orissa as far as the Kistna river, also Burma.

SYNOPSIS OF SPECIES.

1. *Aspidoparia morar*, D. 9-10, A. 10-12, L. l. 38-42. India generally (except the Western coast and South of the river Kistna), Assam and Burma.
2. *Aspidoparia jaya*, D. 9, A. 9, L. l. 52-60. N.W. Provinces and Assam.

1. Aspidoparia morar, Plate CXLVI, fig. 4.

Cyprinus morar, Ham. Buch. pp. 264, 384, pl. 31, f. 5; Gray and Hard. Ill. Ind. Zool. (from H. Buch.); Cuv. and Val. xvi, p. 459.

Leuciscus morar, McClell. Ind. Cyp. pp. 294, 410; Sykes, P. Z. Soc. 1841, p. 363; Bleeker, Beng. pp. 68, 136; Jerdon, M. J. L. and Sc. 1849, p. 323.

Morara morar, Bleeker, Prod. Cyp. p. 115.

Aspidoparia sardina, Heckel, Russ. Reis. ii, 3, p. 288; Günther, Catal. vii, p. 285.

Aspidoparia (?) morar, Günther, Catal. vii, p. 285.

Bayi, Ooriah: *Morari* and *Morar*, Beng.: *Pa-o-char* and *Chilwa*, Punj.: *Ka-reer-re*, Sind.: *Amlee*, Dec.: *Chippuah*, *Chelluah*, Hind. (N. W. P.): *Mou-ah* and *Boreala*, Assam.: *Nga-hpyen-boo* and *Yen-boung-za*, Burmese.

B. iii, D. 9-10 ($\frac{2-3}{7-8}$), P. 15, V. 8, A. 10-12($\frac{2}{8-10}$), C. 19, L. l. 38-42, L. tr. $5\frac{1}{2}$/5, Vert. 14/21.

Length of head 5 to $5\frac{3}{4}$, of caudal 5, height of body 4 to $5\frac{1}{2}$ in the total length. *Eyes*—diameter 3 to $3\frac{2}{3}$ in the length of head, 3/4 to 1 diameter from end of snout, and 1 apart. Snout very obtuse. Upper jaw the longer, and overlapping the lower. The cheek covered by a broad suborbital ring of bones. *Teeth*—pharyngeal, 5, 4, 2/2, 4, 5, plough-shaped, the outer row much larger than the inner ones. *Fins*—dorsal higher than long, with a concave superior margin: it arises midway between the posterior margin of the orbit and the base of the caudal: pectoral as long as the head. *Lateral-line*—$2\frac{1}{2}$ to 3 rows of scales between it and the base of the ventral fin: 20 rows before the base of the dorsal fin. *Colours*—back light brown, divided from the silvery side by a burnished streak.

Habitat.—Sind, Punjab, Continent of India (except the Western coast, and localities south of the Kistna river), also Assam and Burma. It attains at least 7 inches in length. In one specimen, captured in Orissa, the anal fin was entirely absent.

2. Aspidoparia jaya, Plate CXLV, fig. 9.

Cyprinus jaya, Ham. Buch. Fish. Ganges, pp. 333, 392; Cuv. and Val. xvi, p. 439.

Leuciscus margarodes, McClell. Ind. Cyp. pp. 294, 411.

Leuciscus jaya, Bleeker, Beng. p. 68.

Aspidoparia jaya, Günther, Catal. vii, p. 286.

Chola, Assam.: *Pahruah*, Hind. (N. W. P.).

B. iii, D. 9 ($\frac{2}{7}$), P. 15, V. 8, A. 9 ($\frac{2}{7}$), C. 21, L. l. 52-60, L. tr. 7/10.

Length of head $5\frac{1}{4}$ to $5\frac{1}{2}$, of caudal $4\frac{1}{4}$ to $4\frac{1}{2}$, height of body 5 in the total length. *Eyes*—diameter 2/7 of length of head, 3/4 to 1 diameter from end of snout, $1\frac{1}{2}$ diameters apart. Mouth generic, considerably overhung by the snout. Both the preorbital and first suborbital bones touch the upper lip: only about half the cheek is covered by the suborbital ring of bones. *Teeth*—pharyngeal, 4, 3/3, 4, the outer row plough-shaped and compressed, the inner consisting of very minute teeth. *Fins*—dorsal commences midway between the snout and the base of the caudal, and opposite the insertion of the ventral. Caudal lobes of equal length. *Scales*—

deciduous. *Lateral-line*—curving at its termination on to the lower half of the caudal fin: $4\frac{1}{2}$ rows of scales between it and the base of the ventral fin. *Colours*—silvery, back darkest.

Habitat.—Hurdwar on the Ganges and Assam.

C.—Dorsal fin commencing above the interspace between the ventrals and anal, generally extending to over the latter, which is of moderate length or elongated (7 to 33 branched rays).

Genus, 23—ROHTEE, *Sykes*.

Osteobrama, Heckel; *Smiliogaster*, Bleeker.

Abdomen rounded. Pseudobranchiæ present. Mouth anterior, lips thin. Barbels present or absent, sometimes they are quite rudimentary. Pharyngeal teeth, 6 or 5 or 4, 4 or 3, 2 or 3/3 or 2, 3 or 4, 4 or 5 or 6. Dorsal fin short, having an osseous serrated spine, and commencing opposite the interspace between the bases of the ventral and anal fins, the latter of which has many rays. Scales small. Lateral-line passing nearly to the centre of the base of the caudal fin. Gill-rakers short.

*Geographical distribution.**—India generally, and Burma.

SYNOPSIS OF SPECIES.

b. With four barbels.

1. *Rohtee Bakeri*, D. 11, A. 14, L. l. 44. Travancore.
2. *Rohtee Neilli*, D. 12, A. 20, L. l. 59. Bowany river, Madras Presidency.

c. Without any, or with only rudimentary barbels.

3. *Rohtee cotio*, D. 11-12, A. 29-36, L. l. 55-70. Sind, India (except Malabar and south of the Kistna), and Burma.
4. *Rohtee Vigorosii*, D. 11, A. 25-28, L. l. 75-80. Deccan and throughout Kistna and Godavery rivers.
5. *Rohtee Belangerii*, D. 11-12, A. 20-21, L. l. 68-73. Godavery river and Burma.
6. *Rohtee Ogilbii*, D. 11, A. 16, L. l. 55. Deccan, the Kistna and Godavery rivers.

1. Rohtee Bakeri, Plate CXLVII, fig. 1.

Day, Proceed. Zool. Soc. 1873, p. 240.

B. iii, D. 11($\frac{3}{8}$), P. 13, V. 10, A. 14($\frac{3}{11}$), L. l. 44, L. tr. 8/7.

Length of head from 5 to 6, of caudal $3\frac{1}{2}$ to $3\frac{2}{3}$, height of body from 4 to $4\frac{1}{2}$ in the total length. *Eyes*—longest transversely, diameter 2/5 of length of head, 2/3 of a diameter from end of snout, and 1 apart. Profile over nape rather concave, a considerable rise to the base of the dorsal fin. Mouth small, horseshoe-shaped, upper jaw the longer. *Barbels*—four, all very short. *Fins*—dorsal rather higher than the body, and commencing midway between the end of the snout and the base of the caudal, its spine weak, as long or rather longer than the head, and serrated posteriorly in almost its whole extent. Caudal deeply forked, lobes of equal length. *Scales*—$5\frac{1}{2}$ rows between the lateral-line and the base of the ventral fin: 15 rows before the base of the dorsal fin. *Colours*—silvery, caudal and dorsal edged with black.

Habitat.—Cottayam in Travancore, from whence I received specimens up to $4\frac{1}{2}$ inches in length, collected by the Rev. H. Baker, after whom I named the species.

2. Rohtee Neilli, Plate CXLVI, fig. 5.

Day, Proceedings Zool. Soc. 1873, p. 239.

B. iii. D. 12($\frac{4}{8}$), P. 13, V. 10. A. 20($\frac{3}{17}$), C. 19, L. l. 59, L. tr. 12/18.

Length of head $4\frac{3}{4}$, of caudal $4\frac{3}{4}$, height of body $3\frac{1}{2}$ in the total length. *Eyes*—diameter $2\frac{2}{3}$ in the length of the head, 2/3 of a diameter from end of snout, and also apart. Interorbital space very concave. Profile over nape concave, from thence a considerable rise to the base of the dorsal fin. Upper jaw somewhat the longer. *Barbels*—two pairs, all about as long as the eye. *Fins*—dorsal commences midway between the front edge of the eye and the base of the caudal fin, it is 3/4 as high as the body, its last undivided ray osseous, very strong, serrated, and as long as the head excluding the snout. Pectoral nearly as long as the head. Ventral arises beneath the fourth dorsal ray and reaches the commencement of the anal. Caudal deeply forked. *Lateral-line*—strongly marked in its first few scales, the rows of scales nearly regular: 8 rows between the lateral-line and base of ventral fin. Free portion of the tail as long as high. *Colours*—silvery, opercles golden.

Habitat.—Bowany river at base of the Neilgherry hills.

* A difficulty exists respecting the localities given for the following specimens in the British Museum collection:—*Osteobrama rapax*, Günther, or *Rohtee Vigorsii*, Sykes, is stated to have been presented by Lieut.-Col. Playfair from the "northern parts of the Indian Peninsula." Referring to Preface, p. iv and to *Labeo striolatus*, Günther, p. 62—*L. boggut*, Sykes, one is led to conclude that by this term is meant Poona in the Deccan. The same expression for Poona is seen under the head of *Osteobrama* or *Rohtee Ogilbii*, Sykes, in B. M. catalogue, vii, p. 324!

3. Rohtee cotio, Plate CLI, fig. 1.

Cyprinus cotio, Ham. Buch. Fish. Ganges, pp. 339, 393, pl. 39, f. 93; Cuv. and Val. xvii, p. 76.
Abramis cotis, McClell. Ind. Cyp. pp. 288, 388.
Osteobrama cotis, Heckel, in Russ. Reiss. i, p. 1033.
Leuciscus cotis, Cuv. and Val. xvii, p. 76; Bleeker, Beng. p. 66.
Abramis Gangeticus, Swains. Fish. ii, p. 285.

Variety, **Rohtee Alfrediana**, Plate CXLVII, fig. 2.

Leuciscus Duvaucelii, Cuv. and Val. xvii, p. 77; Bleeker, Beng. p. 66.
Leuciscus Alfredianus, Cuv. and Val. xvii, p. xvi, (index) pl. 488.
Osteobrama cotis, Blyth, J. A. S. of Bengal, 1860, p. 158.
Osteobrama Alfredianus, Günther, Catal. vii, p. 324.
Koti and *Goonta*, Beng.: *Goordah*, *Chen-da-lah* and *Muck-nee*, Hind. (N. W. Prov.): *Puttoo* and *Duh-riee*, Sind.; *Nga-hpan-ma*, Burm.

B. iii, D. 11-12($\frac{3-4}{8}$), P. 13, V. 10, A. 29-36($\frac{2-2}{27}$-$\frac{3}{33}$), C. 19, L. l. 55-70, L. tr. 9-15/14-21.

Length of head $5\frac{1}{2}$ to 6, of caudal $4\frac{1}{2}$ to 5, height of body 3 to $3\frac{1}{3}$ in the total length. *Eyes*—diameter $2\frac{1}{2}$ to 3 in the length of head, 1/2 a diameter from the end of the snout, and 1 to $1\frac{1}{4}$ apart. Profile over nape concave, from thence a great rise to the base of the dorsal fin. Upper jaw slightly the longer. *Barbels*—absent or very rudimentary. *Fins*—dorsal commences rather nearer the snout than the base of the caudal fin, its osseous ray is weak and serrated. Pectoral reaches to over the ventral and the latter to the anal. Caudal lobed, the lower lobe the longer. *Scales*—vary in number along the lateral-line, whilst in some specimens (var. *cotio*) the rows are very irregular in the last 3/4 of the body below the lateral-line. The number of rows between the lateral-line and base of the ventral fin also varies, being most in the variety *R. cotio* (12-13), whereas in *R. Alfrediana* there are rarely more than 7 or 8: 24 rows of scales before the base of the dorsal fin. *Colours*—silvery, darkest along the back and sometimes with a silvery lateral band. Some have a black blotch before the base of the dorsal fin, and another on the nape.

These two forms which diverge as widely as given in the two figures show every intermediate gradation. *Osteobrama cotio*, Günther, is not this species, but identical with *R. Vigorsii*, Sykes=*Osteobrama rapax*, Günther.

Habitat.—From Sind throughout India (except the Malabar Coast and south of the Kistna) and Burma. It attains at least 6 inches in length.

4. Rohtee Vigorsii, Plate CXLVII, fig. 3.

Sykes, Trans. Zool. Soc. 1841, p. 36, pl. 63, f. 3; Day, Proc. Zool. Soc. 1869, p. 379.
Systomus Vigorsii, Bleeker, Beng. p. 62.
Abramis Vigorsii, Jerdon, M. J. L. and Sc. 1849, p. 319.
Osteobrama rapax, Günther, Catal. vii, p. 323.
Osteobrama cotio, Günther, Catal. vii, p. 323 (not Ham. Buch.)
Gollund, Ooriah: *Khira*, Tel.

B. iii, D. 11($\frac{3}{8}$), P. 19, V. 10, A. 25-28($\frac{2-3}{23}$-$\frac{}{26}$), C. 19, L. l. 75-80, L. tr. 16-18/21.

Length of head 5, of caudal 4 to 5, height of body 3 to 4 in the total length. *Eyes*—diameter 3 to $3\frac{1}{2}$ in the length of head, 1 diameter from end of snout and also apart. Body very compressed. Dorsal profile elevated, a concavity from the snout to over the nape. Mouth anterior, the lower jaw being somewhat longer than the upper, whilst posteriorly the cleft of the mouth extends to below the anterior margin of the orbit. Preorbital nearly as high as broad, suborbitals very narrow. *Barbels*—absent or a very rudimentary maxillary pair. *Teeth*—pharyngeal, crooked, 5, 4, 2/2, 4, 5. Gill-rakers short and rather widely separated. *Fins*—dorsal commences midway between the base of the ventral and anal, its spine strong and deeply denticulated, its osseous portion not so long as the head. Pectoral as long as the head excluding the snout. Caudal deeply forked, lower lobe the longer. *Lateral-line*—most strongly developed in the first few scales: 11 rows between the lateral-line and base of the ventral fin: 34 rows before the base of the dorsal fin. *Colours*—greenish superiorly, silvery beneath: snout black: the caudal fin slightly stained with gray. The young have a silvery band along the side.

Habitat.—Deccan, Kistna and Godavery rivers to their terminations. It attains at least 9 inches in length.

5. Rohtee Belangeri, Plate CXLVII, fig. 4.

Leuciscus Belangeri, Cuv. and Val. xvii, p. 99.
Systomus microlepis, Blyth, J. A. S. of Bengal, 1858, p. 289, and 1860, p. 158.
Rohtee Blythii, Bleeker, Prod. Cyp. p. 281.
Smiliogaster Belangeri, Bleeker, Atl. Ich. Cyp. p. 33; Günther, Catal. vii, p. 328.
Osteobrama microlepis, Günther, Catal. vii, p. 325.
Nga-hpeh-oung and *Nga-net-hya*, Burm.

B. iii, D. 11-12($\frac{3-4}{8}$), P. 17, V. 9, A. 20-21($\frac{3}{17}$-$\frac{}{18}$), C. 17, L. l. 68-73, L. tr. 18/22.

Length of head $5\frac{1}{2}$ to 6, of caudal $3\frac{2}{3}$ to 4, height of body 3 to $3\frac{1}{2}$ in the total length. *Eyes*—diameter 3 to $3\frac{1}{4}$ in length of head, 3/4 of a diameter from end of snout, $1\frac{1}{2}$ diameters apart. Lower jaw slightly the shorter. Dorsal profile much elevated, a slight concavity over the nape in Bengal specimens. Preorbital of moderate width, the rest of the suborbital ring narrow. *Teeth*—pharyngeal, 4, 3, 2/2, 3, 4, with the outer one in each row serrated on its edges. Gill-rakers rudimentary. *Fins*—dorsal commences about midway between the base of the caudal and the end of the snout, its osseous ray is strong and serrated posteriorly, the bony portion being as long as the head. Caudal deeply lobed, the lower slightly the longer. *Lateral-line*—14 rows of scales between it and the base of the ventral fin: 25 rows before the base of the dorsal fin. *Colours*—silvery, back grayish, and the Indian variety is partially banded in the young. Sometimes a dark streak from the shoulder to the base of the pectoral fin. The very young have a black band over the free portion of the tail.

The late Dr. Bleeker and Dr. Günther who have not seen this fish, have considered it the type of a genus *(Smiliogaster)*, which is said to have the entire abdominal edge trenchant. Valenciennes expressly observes, " mais sans aucune dentelure, comme celles des clupées."

Habitat.—The Godavery river, and throughout Burma, but the specimens from the latter locality are darker in colour and want the vertical bands. It attains 15 inches and more in length.

6. Rohtee Ogilbii, Plate CXLVII, fig. 5.

Sykes, Trans. Zool. Soc. 1841, p. 64, pl. 63, f. 2.
Osteobrama Ogilbii, Heckel. in Russ. Reis. i, p. 1033; Günther, Catal. vii, p. 324.
Systomus Ogilbii, Bleeker, Beng. p. 62.
Abramis Ogilbii, Jerdon, M. J. L. and Sc. 1849, p. 319.

B. iii, D. 11($\frac{3}{8}$), P. 15, V. 10, A. 16($\frac{3}{13}$), C. 20, L. l. 55, L. tr. 13/11.

Length of head 5 to 6, of caudal 4 to $4\frac{1}{4}$, height of body 3 to $3\frac{1}{4}$ in the total length. *Eyes*—diameter $2\frac{2}{3}$ to $3\frac{1}{2}$ in length of head, 2/3 to 1 diameter from end of snout, $1\frac{1}{4}$ diameters apart. Dorsal profile rather more convex than that of the abdomen. Cleft of mouth extending to below the anterior edge of the orbit, lower jaw the shorter. *Barbels*—absent. *Teeth*—pharyngeal, curved, pointed, 5, 4, 2/2, 4, 5. *Fins*—dorsal commences midway between the snout and the base of the caudal, its osseous ray strong, and coarsely serrated. Pectoral reaches to above the ventral. Caudal lobed in its last two-thirds. *Lateral-line*—9 or 10 rows of scales between it and the base of the ventral fin. *Colours*—purplish silvery along the back, becoming silvery-white from about four rows of scales above the lateral-line. The young sometimes have a dark spot at the base of the caudal fin, and 4 or 5 narrow black bands descending from the back to the middle of the side.

Habitat.—Deccan, the Kistna and Godavery rivers, attaining 6 inches or more in length.

Genus, 24—Barilius, *Hamilton Buchanan.*

Opsarius, sp. McClelland; *Pachystomus*, Heckel; *Chedrus*, Swains.; *Shacra*, Bleeker; *Opsaridium*, Peters; *Pteropsarion* and *Bola* (not H. B.) Günther.

Abdomen rounded. Pseudobranchiæ present. Mouth anterior, sometimes oblique, having a moderate or deep cleft. Jaws compressed, the lower usually with a knob above the symphysis, and an emargination to receive it in the upper jaw. Suborbital ring of bones generally broad, more especially the third, which may even be entirely behind the vertical from the posterior margin of the orbit. Barbels four (Pachystomus, "Heckel," Bleeker*), or two (Bendilisis,* Bleeker*), or none (Barilius,* Ham. Buch.)*; occasionally very rudimentary ones are present. Pharyngeal teeth in two or three rows, hooked, 5, 3 or 4, 2 or 1/1 or 2, 4 or 3, 5; or else 5, 2 or 3, 4/4, 3 or 2, 5. Dorsal fin without osseous ray, of moderate length, inserted posteriorly to the ventrals, sometimes extending to above the anal, which latter is somewhat elongated. Scales of moderate or small size. Lateral-line concave, continued on to the middle or lower half of the caudal,* or incomplete, or absent. Gill-rakers very short, or even absent.*

The genera *Barilius* and *Danio* are somewhat difficult to diagnose apart, from descriptions alone: the former however has the snout compressed, the mouth anterior, and usually spots or vertical bars on the body. In *Danio* the upper jaw is rather broad, the mouth directed obliquely upwards, the apex of the lower jaw being nearly or quite on a level with the dorsal profile: the body with longitudinal bands. Adult specimens of *Barilius* have usually open pores or glands on the snout and jaws.

Geographical distribution.—Fresh waters of India, Ceylon, and Burma, extending to the Malay Archipelago; also found in the Nile and East Africa.

SYNOPSIS OF SPECIES.

A. *With four barbels. (Pachystomus).*

1. *Barilius vagra*, D. 9, A. 13-15, L. l. 42-44. With 10 vertical bars. Sind Hills, Himalayas, Ganges, Jumna and Brahmaputra.

* Where this line terminates evidently cannot have very great signification, for I have observed it in *B. gatensis* on one side of an example going to the middle of the base of the caudal fin, and on the other side to its lower lobe.

2. *Barilius modestus*, D. 9, A. 12-13, L. l. 43. Back dark, sides silvery. Sind and Punjab.
3. *Barilius radiolatus*, D. 9, A. 12, L. l. 56-62. Silvery. Central India.
4. *Barilius shacra*, D. 9, A. 10, L. l. 60-70. Twelve vertical bars. Bengal, N.W. Provinces and Assam.
5. *Barilius bendelisis*, D. 9, A. 9-10, L. l. 40-43. Short vertical bars: each scale with a black spot in adults. From Western Ghauts throughout India (not Sind) to Assam.

B.—*With two barbels. (Bendilisis).*

6. *Barilius barila*, D. 9, A. 13-14, L. l. 43-46. With 14 or 15 vertical bars. Bengal, Orissa, and Lower Assam.

C.—*Without or with only rudimentary barbels. (Barilius).*

7. *Barilius Bakeri*, D. 13, A. 16-17, L. l. 38. A row of large spots. Travancore.
8. *Barilius gatensis*, D. 10-12, A. 15-17, L. l. 40. With 15 vertical bars. Western Ghauts and Neilgherries.
9. *Barilius Canarensis*, D. 12-13, A. 14-16, L. l. 38. Two rows of spots. Canara.
10. *Barilius barna*, D. 9, A. 13-14, L. l. 39-42. Nine vertical bands. Orissa, Bengal, Assam.
11. *Barilius guttatus*, D. 9, A. 14, L. l. 44-48. Two rows of spots. Burma.
12. *Barilius tileo*, D. 9, A. 13, L. l. 70-75. Two rows of spots. Bengal and Assam.
13. *Barilius Evezardi*, D. 9, A. 14-15, L. l. 40. Silvery. Poona.
14. *Barilius bola*, D. 10-11, A. 13, L. l. 88-94. Two rows of blotches. Orissa, Bengal, Assam.

A.—*With four barbels. (Pachystomus.)*

1. Barilius vagra, Plate CXLVIII, fig. 3.

Cyprinus vagra, Ham. Buch. Fish. Ganges, pp. 269, 385; Cuv. and Val. xvi, p. 420.
Opsarius isocheilus, McClelland, Ind. Cyp. pp. 298, 421, pl. 56, f. 1 (from H. B.'s MSS.)
? Opsarius piscatorius, McClell. Cal. Journ. Nat. Hist. ii, 1842, p. 582.
Leuciscus piscatorius and *vagra*, Bleeker, Beng. p. 68.
Barilius alburnus, Günther, Catal. vii, p. 289.
Barilius Bleekeri, Day, Journ. Asiat. Soc. Beng. 1872, p. 5 (*young*).
Lo-har-ree and *Charl*, Punj.: *Mon-e-o-ree*, Assam.

B. iii, D. 9($\frac{2}{7}$), P. 16, V. 9, A. 13-15($\frac{2-3}{11-12}$), C. 19, L. l. 42-44, L. tr. 7-8/4, Vert. 16-23.

Length of head 5 to $5\frac{1}{2}$, of caudal 5, height of body 5 to 6 in the total length. *Eyes*—diameter $3\frac{1}{2}$ to 4 in length of head, 1 diameter from end of snout, and $1\frac{1}{4}$ apart. The posterior extremity of the maxilla extends to beneath the middle of the orbit; lower jaw slightly the longer. Third suborbital bone twice as deep as the uncovered portion of the cheek below it. Jaws of equal length anteriorly, the upper sometimes a little notched, the lower covered with large pores in the adult. Axillary process very short. *Barbels*—rostral nearly half as long as the head, maxillary pair very short. *Teeth*—pharyngeal, crooked, 5, 3, 2/2, 3, 5. *Fins*—dorsal higher than long, commencing midway between the posterior edge of the orbit and the root of the caudal, its last two rays being over the anal; pectoral not quite so long as the head: caudal deeply forked. *Lateral-line*—2 to $2\frac{1}{2}$ rows of scales between it and the base of the ventral fin: 20 rows before the base of the dorsal fin. *Colours*—silvery, 10 to 14 dark bands (sometimes indistinct) descend from the back to the lateral-line: fins yellowish, the edge of the caudal stained grayish.

Both Ham. Buch. and McClelland overlooked the barbels.

Habitat.—Sind hills, rivers in the Himalayas and Sub-Himalayan range, Jumna and Ganges, also the Punjab and Assam. It attains above five inches in length. Kelaart sent a Ceylon specimen to the E. I. Museum.

2. Barilius modestus, Plate CLI, fig. 3.

? Opsarius bicirrhatus, McClelland, Cal. Journ. Nat. Hist. ii, 1842, p. 582.
? Leuciscus bicirrhatus, Bleeker, Beng. p. 66.
? Barilius bicirrhatus, Günther, Catal. vii, p. 290.
Barilius modestus, Day, J. A. S. of Beng. 1872, p. 4.

B. iii, D. 9($\frac{2}{7}$), P. 15, V. 9, A. 12-13($\frac{2}{10-11}$), C. 19, L. l. 43, L. tr. 6/$4\frac{1}{2}$.

Length of head $5\frac{1}{2}$, of caudal $5\frac{1}{2}$, height of body $5\frac{1}{4}$ in the total length. *Eyes*—diameter 4 in the length of the head and situated in its anterior half, 1 diameter from end of snout and also apart. Suborbital ring of bones wide, the third nearly touching the preopercular ridge. Upper jaw slightly the longer, and notched at its end in large examples. The posterior extremity of the maxilla reaches to below the middle of the orbit. *Barbels*—rostral extend to beneath the front margin of the eyes, the maxillary pair minute. Axillary process short. *Fins*—dorsal two-thirds as high as the body below it, commencing midway between the middle of the caudal lobes and the snout: it is entirely, or all but the last ray, in advance of the anal. Pectoral nearly as long as the head, but not reaching the ventrals, which last extend half way to the base of the anal. *Lateral-line*—very slightly concave, two and a half rows of scales between it and the base of the ventral fin: 19 rows before the base of the dorsal fin. *Colours*—back brownish, strongly defined from the silvery sides: caudal edged with dark: the other fins yellow: a dark band along the dorsal.

Habitat.—The Indus in Sind, and the Ravi river at Lahore. It attains four or five inches in length.

3. Barilius radiolatus.

Günther, Catal. vii. p. 287.

B. iii, D. 10 ($\frac{2}{8}$), P. 17, V. 9, A. 12($\frac{2}{10}$), C. 19, L. l. 56-62, L. tr. 9-10/6.

Length of head $4\frac{1}{4}$ to $4\frac{1}{2}$, height of body $4\frac{1}{2}$ in the total length excluding the caudal fin. *Eyes*—diameter 3 in length of head, 3/4 to 1 diameter from end of snout, and rather more apart. The posterior extremity of the maxilla extends to a little behind the front edge of the orbit; lower jaw slightly projects when the mouth is closed. The third suborbital bone nearly reaches the preopercular ridge. Axillary process short. *Barbels*—Two short pairs. *Fins.*—the dorsal higher than long, commencing midway between the eye and the root of the caudal fin, its last ray not extending so far as to above the anal. Pectoral does not reach the ventral nor the latter the anal. Caudal apparently deeply forked. *Lateral-line*—2 rows of scales between it and the base of the ventral fin: 24 rows before the base of the dorsal fin. The specimens in the British Museum are in a very bad state, their tails having been almost destroyed.

Habitat.—Central India.

4. Barilius shacra, Plate CXLVIII, fig. 5.

Cyprinus shacra, Ham. Buch. Fish. Gang. pp. 271, 385.
Barbus schagra, Cuv. and Val. xvi, p. 196; Bleeker, Beng. p. 60.
Opsarius cirrhatus, McClell. Indian Cyp. pp. 296, 416, pl. 56, f. 5, (from H. B. MSS.)
Shacra cirrhata, Günther, Catal. vii, p. 294.
Gürha, Punj.

B. iii, D. 9($\frac{2}{7}$), P. 15, V. 8, A. 10($\frac{2}{8}$), C. 19, L. l. 60-70, L. tr. 10-11/9.

Length of head 5 to $5\frac{1}{4}$, of caudal $5\frac{1}{2}$, height of body 5 in the total length. *Eyes*—diameter $3\frac{1}{2}$ to 4 in the length of head, 1 diameter from end of snout, and also apart. Snout compressed, jaws of about equal length in front. The maxilla reaches to below the anterior margin of the orbit: third suborbital bone 2/3 as wide as the uncovered portion of the cheek below it. *Barbels*—the maxillary pair as long as the eye, the rostral slightly longer. Axillary process extends to rather behind the origin of the pectoral fin. *Teeth*—pharyngeal, 5, 3/3, 5, crooked. *Fins*—dorsal commences midway between the anterior margin of the orbit and the base of the caudal fin, its last ray is over the first of the anal. The six outer pectoral rays strong, more especially in the adult. Caudal deeply forked. *Gill rakers*—rudimentary. *Lateral-line*—goes to the centre of the base of the caudal fin, about 7 rows of scales between it and the base of the ventral fin: 25 before the dorsal fin. *Colours*—back olive, rest of the body pinkish silvery: about twelve incomplete bars go from the back downwards towards the lateral line, a dark bar along the upper third of the dorsal fin. The lower two-thirds of the vertical fins stained in some examples.

Habitat.—From Hurdwar down the valley of the Ganges, the N.W. Provinces and Assam. The species is said to attain 5 inches in length.

5. Barilius bendelisis, Plate CXLVIII, figs. 7, 8, and 9.

Cyprinus bendelisis, Ham. Buch. Journ. Mysore, iii, p. 345, pl. 32, and Fish. Gang. pp. 270, 385; McClell. Ind. Cyp. pp. 297, 418.

Cyprinus cocsa, chedra, and *tila*, Ham. Buch. Fish. Ganges, pp. 272, 273, 274, 385, pl. 3, f. 77; Gray and Hardw. Ill. Ind. Zool. (from Ham. Buch. MSS).: McClell. Ind. Cyp. pp. 293, 409: Cuv. and Val. xvi, pp. 421, 422.

Leuciscus cocsa, branchiatus, brachiatus, and *clingulatus*, McClell. Ind. Cyp. pp. 293, 294, 409, 411, 412, pl. 42, f. 5, and pl. 62. f. 4; Cuv. and Val. xvi, p. 469.

Cyprinus apiatus, Val. in Jacq. Voy. Ind. Or., Atl. t. 15, f. 3; McClell. Ind. Cyp. pp. 293, 408.
Leuciscus apiatus, Cuv. and Val. xvii, pp. 351, 495, pl. 510; Bleeker, Beng. p. 66.
Barbus cocsa, Cuv. and Val. xvi, p. 197; Bleeker, Beng. p. 60.
Gobio bendelisis, Cuv. and Val. xvi, p. 316; Bleeker, Beng. p. 62.
Chedrus Grayi, Swainson, Fish. ii, p. 285.
Leuciscus tila and *chedra*, Bleeker, Beng. pp. 66, 68.
Leuciscus rubripes, Jerdon, M. J. L. and S. 1849, p. 323.
Opsarius bendelisis and *dualis*, Jerdon, M. J. L. and S. 1849, p. 330.
Chedrus cocsa, Stein. Sitz. Ak. Wiss. Wien, 1867, lvi, p. 52.
Barilius bendelisis and *cocsa*, Günther, Catal. vii. p. 288.
Khoksa, Beng.; *Pak-tah, Kun-nul, Dah-rah, Burreah* and *Puck-wah-ree*, Punj.; *Johra*, Mahr.: *Aguskitti*, Tam.

B. iii, D. 9($\frac{2}{7}$), P. 15, V. 9, A. 9-10($\frac{2-3}{7-8}$), C. 18, L. l. 40-43, L. tr. 7-8/5.

Length of head $4\frac{2}{3}$ to $5\frac{1}{4}$, of caudal 5 to $5\frac{1}{2}$, height of body $4\frac{1}{4}$ (to $5\frac{1}{4}$ in the young) in the total length. *Eyes*—diameter $4\frac{1}{4}$ to $4\frac{2}{3}$ in length of head, $1\frac{1}{2}$ diameters from end of snout, and $1\frac{1}{4}$ apart. The maxilla reaches to below the first third of the orbit. The third suborbital bone varies in depth from being equal, to twice as high as the uncovered portion of the cheek below it. Open pores on the snout and lower jaw in the adult or even in the young in examples from hilly districts, sometimes pores on preorbital. Axillary process broad, lancet-shaped and longer in some examples than in others. *Barbels*—four, generally short, the rostral pair occasionally

absent. *Teeth*—pharyngeal, 5, 4, 2/2, 4, 5. *Fins*—dorsal higher than its base is long, it commences nearer the base of the caudal fin than the snout, and does not extend to over the anal. Pectoral may or may not reach the ventral, its outer six rays are thickened and very stiff in some examples, especially males from the hills. Ventral in some does, in others does not reach the vent. Caudal forked, lower lobe usually slightly the longer. *Lateral-line*—$2\frac{1}{2}$ to $3\frac{1}{2}$ rows of scales between it and the base of the ventral fin: 20 rows before the base of the dorsal fin. *Colours*—silvery shot with purple: back of a slaty gray descending in bars towards the lateral-line, and most distinct in immature specimens. In adults these bars become indistinct and sometimes lost. Each scale in adults with a black spot at its base, and two on each forming the lateral-line, but no spots in the young. Fins whitish, tinged with orange. A gray margin to the dorsal and caudal, the lower lobe of which is sometimes stained black. Shoulder process black-edged.

This fish shows considerable alterations in colour and form as it gets older, whilst there are likewise individual variations that deserve notice as such have been considered species.

Barilius bendelisis, fig. 7, is the young, with the bars well marked, the spots on the scales not yet developed, and in which the size of the third suborbital shows great variations in comparison with the extent of the uncovered portion of the cheek below it. The example figured was from Mysore, near where Buchanan obtained his type.

Variety *B. cocsa*, fig. 8, shows rather a deep third suborbital bone, the eyes a little larger, the dorsal, pectoral and ventral not so developed as in the next variety. The size of the axillary process and the presence or absence of bars on the back are subject to individual variation. Some dissected at Simla were females.

Variety *B. chedra*, fig. 9, has the third suborbital less deep than in the preceding form, the dorsal, pectoral and ventral more developed, and the axillary process larger. The outer pectoral rays are very stiff. The example figured, was a male from Simla.

The MSS. figure of *Leuciscus rubripes*, Jerdon, appears to be intended for this fish.

The ova of this species is large, I found them breeding at Cuttack, in the month of November.

Habitat.—Assam and Himalayas through the continent of India as far as the Western ghauts, not recorded from the coast of Malabar or Canara nor from Sind. Found also in Ceylon from whence Dr. Kelaart brought some specimens to the museum of the East India Company. It attains at least six inches in length.

B.—*With two barbels. (Bendilisis.)*

6. **Barilius barila**, Plate CXLVIII, fig. 4.

Cyprinus barila, Ham. Buch. Fish. Gang. pp. 267, 384; Cuv. and Val. xvi, p. 418.
Cyprinus chedrio, Ham. Buch. l. c. pp. 268, 384; Cuv. and Val. xvi, p. 419.
Opsarius anisocheilus, McClell. Ind. Cyp. pp. 298, 422, pl. 48, fig. 8.
Leuciscus barila, Bleeker, Beng. p. 66.
Barilius morarensis, Günther, Catal. vii, p. 290.
Barilius barila, Günther, l. c. p. 291; Day, Proc. Zool. Soc. 1869, p. 378.
Gilland and *Caedra*, Beng.: *Persee*, Hind.

B. iii, D. 9($\frac{2}{7}$), P. 13, V. 9, A. 13-14($\frac{3}{10\text{-}11}$), C. 19, L. l. 43-46, L. tr. 7/5.

Length of head 5 to $5\frac{1}{2}$, of caudal nearly 5, height of body $5\frac{1}{4}$ to $5\frac{1}{2}$ in the total length. *Eyes*—diameter $3\frac{1}{2}$ to 4 in length of head, 3/4 to 1 diameter from end of snout and also apart. Jaws of equal length anteriorly. The posterior extremity of the maxilla reaches to below the anterior third of the orbit. Third suborbital bone wide and nearly touching the preopercular ridge. *Barbels*—a small rostral pair. *Teeth*—pharyngeal, crooked, pointed, 5, 4, 3/3, 4, 5. *Fins*—dorsal commences midway between the posterior margin of the orbit and the base of the caudal fin, and is almost entirely in advance of the anal. Pectoral nearly as long as the head but does not quite reach the ventral: lower caudal lobe the longer. *Lateral-line*—$1\frac{1}{2}$ to 2 rows between it and the base of the ventral fin: 18 rows before the dorsal fin. *Colours*—silvery, with 14 or 15 vertical blue bands in the middle third of the side of the fish.

In the example of *B. barila*, referred to in the B. M. Catal. the author has overlooked the barbels, which though small are present.

Habitat.—Delhi, N. W. and Central Provinces, Bengal, Orissa, and Lower Assam. It grows to 4 inches in length.

C.—*Without any or with only rudimentary barbels. (Barilius).*

7. **Barilius Bakeri**, Plate CLI, fig. 2.

Day, Proc. Zool. Soc. 1865, p. 305, and Fish. Malabar, p. 218, pl. 18.
Pteropsarion Bakeri, Günther, Catal. vii, p. 284.

B. iii, D. 13($\frac{3}{10}$), P. 15, V. 9, A. 16-17($\frac{2\text{-}3}{14}$), C. 17, L. l. 38, L. tr. 9/4.

Length of head $4\frac{1}{4}$ to $4\frac{2}{3}$, of caudal $4\frac{1}{2}$, height of body $3\frac{1}{2}$ to $3\frac{3}{4}$ in the total length. *Eyes*—diameter 4 in length of head, 1 diameter from end of snout, $1\frac{1}{4}$ diameters apart. Mouth compressed, lower jaw the longer with a knob above the symphysis. The posterior extremity of the maxilla extends to nearly below the centre of the orbit. Suborbital ring of bones wide, the third almost entirely covering the cheek. Some pores exist along the margin of the lower lip, on the snout, and on the anterior edge of the preorbital. *Barbels*—absent. *Teeth*—pharyngeal, curved and pointed, 5, 4, 2/2, 4, 5. *Fins*—dorsal commences nearly midway between the front edge of the eye and the base of the caudal, extending to above the fourth anal

ray: caudal forked, lower lobe slightly the longer. *Lateral-line*—2 rows of scales between it and the base of the ventral fin. Gill-rakers rudimentary. *Colours*—grayish, becoming white on the abdomen. A row of large bluish spots along the side. Dorsal, anal, and pectoral fins margined with white, and having dark gray bases. Caudal gray in the centre.

This species is very closely allied to *B. Canarensis*, of which it may be merely a local variety. It forms the type of genus *Pteropsarion*, Günther, excluded from *Barilius* on account of its possessing more than 9 branched dorsal rays* and suborbitals entirely covering the cheeks (which they do not quite effect). As *B. gatensis*, with an equally broad suborbital ring, has 8 branched dorsal rays, I cannot consider such a subdivision of the genus as natural or desirable.

Habitat.—Hill ranges of Travancore, whence I received several specimens collected by the Rev. H. Baker. It attains 6 inches in length.

8. Barilius gatensis, Plate CXLIX, fig. 2.

Leuciscus gatensis, Cuv. and Val. xvii, p. 309, pl. 503; Bleeker, Beng. p. 68.
Opsarius gatensis, Bleeker, Pro. Cyp. p. 288.
Barilius rugosus, Day, Proc. Zool. Soc. 1867, p. 294; Günther, Catal. vii, p. 291.
Barilius gatensis, Günther, Catal. vii, p. 291; Day, Proc. Zool. Soc. 1870, p. 373.
Choaree (at Coonoor) and *Aart-candee* (Bowany), Tam. "River carp."

B. iii. D. 10-12($\frac{2-3}{8-9}$), P. 15, V. 9, A. 15-17($\frac{3}{12-14}$) C. 18, L. l. 39-40, L. tr. 8/5.

Length of head $4\frac{1}{3}$ to $4\frac{1}{2}$, of caudal $5\frac{1}{2}$ to $6\frac{1}{2}$, height of body 4 to $4\frac{1}{2}$ in the total length. *Eyes*—diameter 3 to $4\frac{1}{2}$ in the length of head, 1 to $1\frac{1}{3}$ diameters from end of snout, $1\frac{1}{2}$ diameters apart. Mouth pointed, its cleft extending to below the centre of the orbit. The third suborbital bone is about three times as broad as the uncovered portion of the cheek below it. The anterior portion of the snout and the sides of the jaws covered with large glands: there are likewise some on the lower jaw. *Barbels*—two very minute pairs which appear to be sometimes wanting. *Teeth*—pharyngeal, crooked, pointed, 5, 3 or 4, 2/2, 4 or 3, 5. *Fins*—dorsal commences midway between the end of the snout and the middle of the caudal fin, extending to above the third anal ray. Pectoral as long as the head excluding the snout, its outer ray stiff. Caudal moderately lobed, the lower very slightly the longer. *Lateral-line*—$2\frac{1}{2}$ rows of scales between it and the base of the ventral fin. *Colours*—silvery gray with about 15 vertical bars descending from the back, and which become more or less broken up in the adult. Dorsal and anal with dark bases and light margins. The females and young generally have smooth scales, whereas most of the adult males have one or more rough spots on each.

Habitat.—Western Ghauts of Malabar and Neilgherry hills, up to about 5000 feet above the level of the sea. It attains at least 6 inches in length. The example figured (life-size) was from the Neilgherry hills.

9. Barilius Canarensis, Plate CXLIX, fig. 1.

Opsarius Canarensis and *Malabaricus*, Jerdon, M. J. L. and S. 1849, p. 329.
Barilius Canarensis, Day, Proc. Zool. Soc. 1870, p. 374.

B. iii, D. 12-13($\frac{2}{10-11}$), P. 15, V. 9, A. 14-16($\frac{2}{12-14}$), C. 21, L. l. 38, L. tr. 9/4.

Length of head $4\frac{1}{2}$ to $4\frac{3}{4}$, of caudal 5 to $5\frac{1}{2}$, height of body $3\frac{1}{2}$ to $3\frac{2}{3}$ in the total length. *Eyes*—diameter $3\frac{1}{2}$ in length of head. 1 diameter from end of snout and also apart. Suborbitals nearly cover the cheek. The posterior extremity of the maxilla reaches to below the anterior third of the orbit. *Barbels*—absent. *Fins*—the dorsal fin commences midway between the snout and the base of the caudal. *Lateral-line*—$2\frac{1}{2}$ rows of scales between it and the base of the ventral fin: 15 rows before the dorsal fin. Gill-rakers distinct. *Colours*—greenish above, golden on the sides, a single or double row of large vertical green spots along the body. Fins gray, with broad white margins.

Opsarius Malabaricus, Jerdon, appears to be a variety of this species. I have received a very complete series from Canara, collected by H. S. Thomas, Esq., C. S., and I can find no difference, except in the dorsal fin being a little higher and a row of small blue spots (9-12) exists along the middle of the side, sometimes 2 rows being present in the first third of the body.

Habitat.—Canara and Malabar on the Western coast; attaining 6 inches in length.

10. Barilius barna, Plate CXLVIII, fig. 1 *(young)*, and 2 *(adult)*.

Cyprinus barna, Ham. Buch. Fish. Ganges, pp. 268, 384; Cuv. and Val. xvi, p. 419.
Opsarius fasciatus, *latipinnatus* and *acanthopterus*, McClell. Ind. Cyp. pp. 269, 298, 417, 422, pl. 48, f. 7, and 9; Cuv. and Val. xvi, p. 472.
Cyprinus barna, Cuv. and Val. xvi, p. 419.
Leuciscus acanthopterus and *barna*, Bleeker, Beng. p. 66.
Barilius barna, Günther, Catal. vii, p. 290.
Barilius papillatus, Day, Proc. Zool. Soc. 1869, p. 378 *(young)*.
Bahri, Ooriah: *Balisundree* and *Oz-o-la*, Assam.

B. iii, D. 9($\frac{2}{7}$), P. 15, V. 9, A. 13-14($\frac{3}{10-11}$), C. 19, L. l. 39-42, L. tr. 8-9/6.

* *Pteropsarion* is said to have "dorsal fin elongate, with more than 9 branched rays;" and *Barilius* to have "dorsal fin short, with less than 9 branched rays"!

Length of head $4\frac{3}{4}$ to $5\frac{1}{4}$, of caudal 5, height of body $3\frac{1}{2}$ to 4 in the total length. *Eyes*—diameter $2\frac{1}{2}$ to $3\frac{1}{2}$ in the length of the head, 2/3 to 1 diameter from the end of snout, and $1\frac{1}{3}$ apart. Third suborbital bone thrice as deep as the uncovered portion of the cheek below it. The maxilla reaches to beneath the first third of the orbit: the adult has open pores on both jaws and snout. Axillary process reaches to above the base of the pectoral fin. *Barbels*—absent. *Fins*—dorsal varies considerably, commencing midway between the eye and the base of the caudal fin, it is elevated in some specimens but not in others, while the last ray may extend (especially in the young) almost to the base of the caudal fin. The pectoral reaches to above the ventral, and in the young has its outer rays thickened. The ventral does not extend to the anal in the young, its inner rays are very thick. Anal commences under the middle or end of the dorsal fin. *Lateral-line*—$2\frac{1}{2}$ rows of scales between it and the base of the ventral fin: 16 rows before the base of the dorsal fin. *Colours*—of a dull green in the adult, with from 9 to 11 vertical dark bands on the body: dorsal and caudal fins edged with black. The young (*B. papillatus*) have the back gray, the sides silvery shot with gold, and from 7 to 9 narrow deep blue vertical bands. Fins yellow, the dorsal and caudal stained externally with black.

Habitat.—Assam, the Ganges and its branches, Bengal and Orissa. It attains 5 inches or more in length. Fig. 1 shows how much more forward the anal is in the young than in the adult fig. 2.

11. **Barilius guttatus**, Plate CXLIX, fig. 3.

Opsarius guttatus, Day, Proc. Zool. Soc. 1869, p. 620.

Nga-la-wah, Burm.

B. iii, D. $9(\frac{2}{7})$, P. 15, V. 9, A. $14(\frac{3}{11})$, C. 17, L. l. 44-48, L. tr. 9/5.

Length of head $4\frac{1}{2}$ to $4\frac{2}{3}$, of caudal $4\frac{1}{2}$ to 5, height of body $5\frac{1}{2}$ to 6 in the total length. *Eyes*—diameter 4 to 5 in the length of the head, 1 to $1\frac{1}{4}$ diameters from the end of snout and apart. Cleft of mouth deep, extending nearly 1 diameter behind the orbit. Snout compressed: upper jaw the longer. A well-developed knob above symphysis of lower jaw. Suborbitals very broad, more especially the hindermost which is nearly behind the vertical from the posterior margin of the orbit, and almost covers the cheek. *Barbels*—a rudimentary rostral or maxillary pair may be present. *Fins*—dorsal commences midway between the posterior extremity of the orbit and the base of the caudal, being opposite the interspace between the ventral and anal fins. Caudal forked, lower lobe slightly the longer. *Lateral-line*—complete, 2 rows of scales between it and the ventral fin: 23 rows before the base of the dorsal fin. *Colours*—silvery shot with purple, one or two rows of blue spots along the side. Lower caudal lobe orange, its upper lobe with a dark edging, and a dark band along the upper half of the lower lobe.

Habitat.—Irrawaddi from Prome to Mandalay; attaining at least 7 inches in length.

12. **Barilius tileo**, Plate CXLIX, fig. 5.

Cyprinus tileo, Ham. Buch. Fish. Ganges, pp. 276, 385; Cuv. and Val. xvi, p. 420; Gray and Hard. Ill. Ind. Zool. (from H. B.'s MSS.)

Opsarius maculatus and *brachialis*, McClell. Ind. Cyp. pp. 297, 417, 418, pl. 47, f. 4, and pl. 48, f. 6; Cuv. and Val. xvi, p. 471.

Leuciscus brachialis and *tileo*, Bleeker, Beng. pp. 60 and 68.

Barilius tileo, Steind. Sitz. Ak. Wiss. Wien. 1867, lvi, p. 61; Günther, Catal. vii, p. 287.

Tilei, *Sel-len*, *Boolla* and *Sund-u-a-rie*, Assam.

B. iii, D. $9(\frac{2}{7})$, P. 14, V. 9, A. $13(\frac{3}{10})$, C. 20, L. l. 70-75, L. tr. 14/7.

Length of head $4\frac{3}{4}$ to $5\frac{1}{4}$, of caudal $4\frac{3}{4}$, height of body $4\frac{2}{3}$ in the total length. *Eyes*—diameter 4 to $4\frac{1}{2}$ in the length of the head, 1 to $1\frac{1}{3}$ diameters from the end of of snout, and $1\frac{1}{2}$ apart. Abdominal profile more convex than the dorsal. Head compressed, snout pointed. Upper jaw slightly the longer when the mouth is closed: symphysial knob not developed. The posterior extremity of the maxilla reaches to beneath the middle of the eye. Suborbital ring of bones broad, the third being about equal to twice the extent of the uncovered portion of the cheek below it. The width of the opercle equals half the distance between the middle of the eye and hind end of the head. Axillary process well-developed, having a soft scaled prolongation. *Barbels*—very rudimentary or entirely absent. *Fins*—dorsal commences midway between the hind edge of the eye and the base of the caudal fin, the anal being behind the vertical from its last ray. Pectoral as long as the head excluding the snout. Caudal deeply forked, lower lobe the longer. *Lateral-line*—$3\frac{1}{2}$ to $4\frac{1}{2}$ rows of scales between it and the base of the ventral fin: 30 rows before the base of the dorsal fin. *Colours*—bluish along the back, becoming silvery on the sides and beneath: two or more rows of blue spots and blotches, having a vertical character, along the sides. Dorsal and caudal fins dark gray, with a light pinkish edge: the other fins yellowish.

Habitat.—Bengal and Assam, attaining at least 5 inches in length.

13. **Barilius Evezardi**, Plate CXLVIII, fig. 6.

Day, Journ. Asiatic Soc. of Bengal, 1872, Pt. ii, p. 326.

B. iii, D. $9(\frac{2}{7})$, P. 13, V. 9, A. $14\text{-}15(\frac{2}{12\text{-}13})$, C. 19, L. l. 40, L. tr. 6-7/4.

Length of head $5\frac{1}{2}$, of caudal $5\frac{1}{2}$, height of body 5 to $5\frac{1}{2}$ in the total length. *Eyes*—diameter 3 in the

length of the head, 3/4 of a diameter from end of snout, and 1 apart. Snout compressed, lower jaw slightly the longer and with a well-developed knob at the symphysis: the maxilla reaches to below the front edge of the eye. Suborbital ring of bones rather wide, the third being more than twice as deep as the uncovered portion of the cheek below it. *Barbels*—absent. *Teeth*—pharyngeal, curved, pointed, 5, 3/3, 5. *Fins*—the dorsal commences about midway between the hind edge of the orbit and the posterior end of the caudal fin, its last half being above the anal. Pectoral as long as the head. Caudal forked, the upper lobe the longer. *Lateral-line*—2 rows of scales between it and the base of the ventral fin. *Colours*—silvery, of a brown tint along the back, and a lateral burnished silvery band. Dorsal, caudal, and anal fins orange, the first two edged with black.

The prominences on the jaw and general appearance of this fish with the absence of the usual vertical bars so common in *Barilius*, gives the species a great resemblance to *Rasbora*, from which however it may be at once distinguished by the number of rays in the anal fin; whilst its distinctly rounded (not cutting) abdomen shows it not to be a *Chela*.

Habitat.—Poona, up to $4\frac{1}{2}$ inches in length. This species was originally received from Col. Evezard, after whom it is named.

14. Barilius bola, Plate CXLIX, fig. 4.

Cyprinus bola and *goha*, Ham. Buch. Fish. Ganges, pp. 274, 275; Gray and Hard. Ill. Ind. Zool. (from H. B.'s MSS.); Cuv. and Val. xvi, pp. 423, 424.

Opsarius gracilis and *megastomus*, McClell. Ind. Cyp. pp. 297, 298, 419, 420, pl. 47, f. 1, and pl. 48, f. 5.

Cyprinus bola and *goha*, Cuv. and Val. xvi, pp. 423, 424; Bleeker, Beng. pp. 66, 68.

Leuciscus salmoides, Blyth, J. A. S. of Bengal, 1858, p. 289.

Barilius goha, Steind, Sitz. Ak. Wiss. Wien, 1867, lvi, p. 63.

Bola goha, Günther, Catal. vii, p. 293.

Opsarius goha, Day, Proc. Zool. Soc. 1869, p. 379.

Bugguah, Ooriah.: *Korang*, Assam: *Bola*, Beng.: *Buggarah*, Hind.

B. iii, D. 10-11 ($\frac{3}{7-8}$), P. 13, V. 9, A. 13 ($\frac{3}{10}$), C. 19, L. l. 88-94, L. tr. 12-15/9-11.

Length of head $4\frac{1}{2}$ to $4\frac{2}{3}$, of caudal $5\frac{1}{2}$, height of body 5 to 6 in the total length.. *Eyes*—before the middle of the length of the head, diameter $4\frac{1}{2}$ to 7 in the length of head, $1\frac{1}{3}$ to 2 diameters from end of snout, and apart. Head compressed, snout pointed, a well developed knob above symphysis of the lower jaw. Suborbital ring of bones wide, especially the third which is wider than the opercle. the width of which last equals one-third of the distance between the middle of the eye and the hind edge of the opercle. Mouth deeply cleft, the posterior extremity of the maxilla extending nearly one diameter of the orbit behind the posterior margin of the eye. *Barbels*—absent. *Fins*—dorsal fin 1/3 higher than long, it commences midway between the angle of the preopercle and the base of the caudal, its last ray being scarcely over the first of the anal. Caudal lobed, the lower lobe slightly the longer. *Lateral-line*—$4\frac{1}{2}$ to 5 rows of scales between it and the base of the ventral fin: 40 rows before the base of the dorsal fin. *Colours*—silvery with two or more vertical rows of bluish blotches along the sides, the upper being about twelve to twenty, and the lower intermediate; some spots also on the head. Lower half of the dorsal fin slightly gray. Caudal orange, stained with gray and black. Pectoral, ventral, and anal orange, the colours being somewhat similar to those of a trout: it often goes by that name amongst Europeans.

Habitat.—Orissa, Bengal, N. W. Provinces, Assam and Burma, attaining at least a foot in length: one killed in Assam by Mr. Hannay, is stated to have weighed 5lb. It is a very game fish, takes the fly well, and is one of those termed *Rajah mas*, or "chief of the fishes" in the Assam rivers.

Genus, 25 *—DANIO, *Ham. Buchanan.*

Perilampus, sp., McClell.: *Paradanio* and *Devario*, Bleeker.

Body compressed, abdomen rounded. Pseudobranchiæ present. Cleft of mouth shallow, directed obliquely upwards, the end of the lower jaw usually forming a portion of the dorsal profile. Suborbitals broad. Barbels four, or two, or none. Pharyngeal teeth hooked, 5, 3, 2/2, 3, 5. Dorsal fin moderately elongated, its posterior rays being opposite the anal which is long. Scales of moderate size. Lateral-line concave, passing to the lower half of the tail. Gill-rakers short.

Geographical distribution.—These prettily marked little fish are found throughout India, Burma, and Ceylon.

SYNOPSIS OF SPECIES.

1. *Danio devario*, D. 18-19, A. 18-19, L. l. 41-48. No barbels. Sind, Punjab, N. W. Provinces, central India, Deccan, Bengal, Orissa, and Assam.

* Genus. 25a—*Tinca*, Cuvier.

Tinca vulgaris, Cuvier, or the Tench. has been introduced into the waters of the Neilgherry hills and is thriving around Ootacamund.

2. *Danio spinosus*, D. 15-16, A. 19-20. L. l. 55-65. No barbels, or a short rostral pair. One or two spines on the margin of the orbit. Burma.

3. *Danio Malabaricus*, D. 12-15, A. 15-19, L. l. 35-37. Rostral barbels, sometimes rudimentary maxillary ones. South Malabar.

4. *Danio æquipinnatus*, D. 12-14, A. 14-16, L. l. 32-34. Rostral and maxillary barbels. Himalayas, Assam, Tenasserim, the Deccan.

5. *Danio dangila*, D. 11-13, A. 17-18. Two pairs of long barbels. Bengal, Behar, Darjeeling.

6. *Danio chrysops*, D. 13, A. 18. No barbels. Bengal.

7. *Danio Neilgherriensis*, D. 12-14, A. 13-14, L. l. 35-37. Rostral and sometimes maxillary barbels. Neilgherry Hills, Madras.

8. *Danio rerio*, D. 9, A. 15-16, L. l. 26-28. Long rostral and usually maxillary barbels. Blue bands. Bengal and Coromandel coast as low as Masulipatam.

9. *Danio albolineatus*, D. 9, A. 13-15, L. l. 31-33. Two pairs of long barbels. A scarlet horizontal band. Moulmein.

10. *Danio nigrofasciatus*, D. 9, A. 13, L. l. 30-32. A maxillary pair of barbels. Blue bands. Pegu and Moulmein.

1. Danio devario, Plate CL, fig. 4.

Cyprinus devario, Ham. Buch. Fish. Ganges, pp. 341, 393, pl. 6, f. 94: Cuv. and Val. xvi, p. 446.
Perilampus devario and *osteographus*, McClell. Ind. Cyp. pp. 288, 289, 391, 392, pl. 45, f. 2 and 3 (erroneously numbered pl. 56, f. 9); Cuv. and Val. xvi, p. 468.
Leuciscus devario, Cuv. and Val. xvi, p. 446; Bleeker, Beng. p. 66.
Leuciscus osteographus, Bleeker, Beng. p. 68.
Devario Macclellandii and *cyanotænia*, Bleeker, Prod. Cyp. p. 283.
Danio devario, Günther, Catal. vii, p. 284; Day, Proc. Zool. Soc. 1869, p. 377.
Bonkuaso, Ooriah: *Debari*, Beng.: *Da-bah* and *Duh-ri-e*, N.W. Prov.: *Khan-ge*, *Maal-le* and *Pur-ran-dah*, Punj.: *Chay-la-ree*, Sind.

B. iii, D. 18-19 ($\frac{3}{15-16}$), P. 13, V. 8, A. 18-19 ($\frac{3}{15-16}$), C. 19, L. l. 41-48, L. tr. 11/5.

Length of head 5 to $5\frac{1}{4}$, of caudal 4, height of body $3\frac{1}{4}$ to $3\frac{1}{2}$ (or even 4) in the total length. *Eyes*—diameter 1/3 of length of head, 3/4 of a diameter from end of snout, $1\frac{1}{4}$ diameters apart. Posterior extremity of maxilla extends to beneath the anterior margin of the orbit; lower jaw the longer. Third suborbital bone broad. *Barbels*—absent. *Fins*—dorsal commences slightly anteriorly to the anal, and midway between the anterior margin of the orbit and the base of the caudal. Caudal lunated. *Lateral-line*—$2\frac{1}{2}$ rows of scales between it and the base of the ventral fin: 16 rows before the base of the dorsal fin. *Colours*—greenish superiorly, silvery white inferiorly. The anterior part of the body is reticulated in its centre by steel-blue lines, divided from one another by narrow vertical yellow bands. Three bluish lines, divided by yellow ones, are continued backwards to the caudal fin, where the two lower amalgamate, and passing upwards become lost on the superior half of the caudal fin.

Habitat.—Sind, Orissa, Bengal, N.W. Provinces, Deccan, Punjab and Assam, attaining 4 inches in length.

2. Danio spinosus, Plate CL, fig. 5.

Day, Proc. Zool. Soc. 1869, p. 621.

B. iii, D. 15-16($\frac{2-3}{13}$), P. 13, V. 7, A. 19-20($\frac{3}{16-17}$), C. 19, L. l. 55-65, L. tr. 12-14/4.

Length of head 5 to $5\frac{1}{4}$, of caudal 5, height of body 3 to $3\frac{1}{2}$ in the total length. *Eyes*—diameter 3 to $3\frac{1}{2}$ in the length of head, 1 diameter from end of snout and also apart. Body strongly compressed: a slight concavity over the occiput. Lower jaw prominent. Third suborbital bone wide and touches the preopercular ridge. In adults there is a sharp spine directed forwards above the anterior superior margin of the orbit, and a second broader and blunter before the centre of the eye on the preorbital. In immature examples these spines are equally sharp. *Barbels*—a small rostral pair. *Fins*—the dorsal commences midway between the posterior extremity of the orbit and the base of the caudal, its first five or six rays are in advance of the anal. Pectoral as long as the head. Caudal lunate. *Lateral-line*—$3\frac{1}{2}$ rows of scales between it and the base of the ventral fin. *Colours*—silvery, with an ill-defined lateral band, and some vertical yellow lines in the anterior half of the body. Dorsal and anal grayish, with reddish margins anteriorly. In the immature there is a dark humeral spot, and a steel-blue lateral band goes to the centre of the caudal fin, which has a scarlet stripe along the last half of its centre. Some examples have a wide blue central band, and two narrow parallel ones superiorly, and the same number inferiorly, they are divided by yellow ground colour.

Habitat.—Burma; attaining at least 4 inches in length.

3. Danio Malabaricus, Plate CL, fig. 7.

? Chela alburna, Heckel, Fische Kaschmir, p. 390, c. fig.
Perilampus Malabaricus, *Canarensis* and *Mysoricus*, Jerdon, M. J. L. and S. 1849, p. 325.

Danio micronema and *lineolatus*, Bleeker, Mem. Soc. Holl. Haarlem, 1864, Ceylon, p. 19, t. 4, fig. 2 and 3; Günther, Catal. vii, p. 282; Day, Proc. Zool. Soc. 1869, p. 560; 1870, p. 374.
Paradanio aurolineatus, Day, Proc. Zool. Soc. 1867, p. 296.
? *Danio alburnus*, Günther, Catal. vii, p. 283.
Danio Malabaricus, Günther, Catal. vii, p. 283.

B. iii, D. 12-15($\frac{2}{10-13}$), P. 15, V. 8, A. 15-19($\frac{3}{12-16}$), C. 19, L. l. 35-37, L. tr. 7½-8/3.

Length of head 5 to 5½, of caudal 5 to 5½, height of body 3½ to 4 in the total length. *Eyes*—diameter 3 to 3½ in the length of head, 1 diameter from end of snout, and 1⅓ apart. Third suborbital bone nearly touches the preopercular ridge. *Barbels*—rostral half as long as the orbit, maxillary ones very short, in some specimens the latter are entirely absent. *Fins*—the dorsal arises midway between the base of the caudal fin and the posterior edge of the eye, its anterior half is in advance of the anal. *Colours*—back steel-blue, some irregular vertical yellow lines on the fore-part of the body, and three or four blue bands along the sides, the central ones coalescing so as to form a broad bluish band along the middle of the caudal fin.

Habitat.—Western coast of India and Ceylon; attaining 6 inches in length.

4. Danio æquipinnatus, Plate CL, fig. 6.

Perilampus æquipinnatus, McClelland, Ind. Cyp. p. 393, pl. 60, f. 1.
Leuciscus æquipinnatus, Bleeker, Beng. p. 66.
Leuciscus lineolatus, Blyth, J. A. S. of Bengal, 1858, p. 219.
Perilampus affinis, Blyth, loc. cit. 1860, p. 163.
Danio lineolatus, Günther, Catal. vii, p. 283.
Pteropsarion æquipinnatus, Günther, Catal. vii, p. 285.

B. iii, D. 12-14($\frac{2}{10-12}$), P. 17, V. 8, A. 14-16($\frac{2}{12-14}$), C. 19, L. l. 32-34, L. tr. 6-7/3½.

Length of head 5, of caudal 5 to 5¼, height of body 4 to 4¼ in the total length. *Eyes*—diameter 2/7 to 1/4 of length of head, 1 diameter from end of snout, and 1½ apart. Third suborbital bone nearly touches the preopercular ridge. Cleft of mouth oblique and extending to under the anterior margin of the orbit, a bluntish knob at the symphysis. *Barbels*—rostral half as long as the orbit, the maxillary ones minute. *Fins*—the dorsal arises midway between the centre of the orbit and the base of the caudal fin, extending to over the anterior anal rays, it is 2/3 as high as the body. Pectoral as long as head without the snout, nearly reaching the ventral, which last does not extend as far as the anal. Caudal forked but not deeply so. *Lateral-line*—1½ rows of scales between it and the base of the ventral fin: 13 rows before the dorsal fin. *Colours*—yellowish white, a wide bluish band extends along the body from the eye to the centre of the base of the caudal fin, in its course are sometimes several round silvery spots, below it is another narrow band (which occasionally joins the central one anteriorly); there are two other lighter bands above the central one. The intermediate ground colour is yellow. Fins yellowish. Dorsal and anal fins each with a broad bluish band along their outer half. In some specimens there is a dark mark behind the gill-opening.

Habitat.—Himalayas at Darjeeling and the whole of the Assam district as high as Suddya, the Naga and Garo hills, Tenasserim and the Deccan.

5. Danio dangila, Plate CL, fig. 3.

Cyprinus dangila, Ham. Buch. Fish. Ganges, pp. 321, 390; Cuv. and Val. xvi, p. 403.
Perilampus reticulatus, McClell. Ind. Cyp. pp. 290, 397, pl. 45, fig. 1 (from H. B.'s MSS.)
Nuria dangila, Bleeker, Beng. p. 62.
Danio dangila, Bleeker, Atl. Ich. vol. i, p. 29; Günther, Catal. vii, p. 282.

B. iii, D. 11-13($\frac{2}{9-11}$), P. 12, V. 7, A. 17-18($\frac{3}{14-15}$), C. 20, L. l. 38. L. tr. 7/4½.

Length of head 5, of caudal 5, height of body 3½ to 4 in the total length. *Eyes*—diameter 1/3 of length of head, 3/4 of a diameter from end of snout. Lower jaw the longer, with a knob at the symphysis. Mouth oblique. *Barbels*—rostral a little shorter than the head; maxillary pair slightly longer. *Fins*—the posterior dorsal rays are above the anterior ones of the anal. Caudal slightly emarginate. *Scales*—2½ rows between the lateral-line and base of the ventral fin: 18 rows before the dorsal fin. *Colours*—back olive colour, abdomen silvery, sides with several narrow blue lines, which in the anterior half or two-thirds of the body, form a beautiful network; a dark spot behind gill covers. Anal fin with two or three blue stripes. A specimen from Darjeeling was deficient in ventral fins.

Habitat.—Bengal, Behar, Himalayas at Darjeeling, also the hills above Akyab; grows to 5 or 6 inches in length.

6. Danio chrysops.

Leuciscus chrysops, Cuv. and Val. xvii, p. 308; Bleeker, Beng. p. 66.

B. iii, D. 13($\frac{3}{10}$), P. 17, V. 8, A. 18($\frac{3}{15}$), C. 19, L. l. 45, L. tr. 8½/4.

Length of head 4⅔, of caudal 4⅔, height of body 4 in the total length. *Eyes*—diameter 2⅔ in length of head, 1/2 a diameter from end of snout, and 1 apart. Snout obtuse, upper jaw slightly the longer. Third suborbital bone nearly as wide as the uncovered portion of the cheek below it. Dorsal profile rather more

convex than that of the abdomen. *Fins*—the dorsal commences midway between the middle of the eye and base of the caudal fin, it is entirely in advance of the anal, and 2/3 as high as the body below it. *Lateral-line*—curves downwards in the pectoral region from whence it proceeds direct to the centre of the base of the caudal. *Colours*—silvery, the upper two-thirds of the body darker than the lower.

Habitat.—Bengal. The type specimen (nearly 4 inches long) is in a good state of preservation at Paris.

7. **Danio Neilgherriensis**, Plate CL, fig. 2.

Paradanio Neilgherriensis, Day, Proc. Zool. Soc. 1867, p. 296.
Danio neilgherriensis, Günther, Catal. vii, p. 283.
Cowlie, Tamil.

B. iii, D. 12-14($\frac{3}{9-11}$), P. 15, V. 7, A. 13-14($\frac{2}{11-12}$), C. 19, L. l. 35-37, L. tr. 6-7/4, Vert. 12/20.

Length of head $4\frac{1}{2}$ to 5, of caudal $4\frac{1}{2}$ to 5, height of body 4 to $4\frac{1}{4}$ in the total length. *Eyes*—diameter 3 to $3\frac{1}{2}$ in the length of head, 2/3 of a diameter from end of snout, $1\frac{1}{4}$ diameters apart. Abdominal profile more convex than the dorsal one. The maxilla reaches to below the front edge of the eye. Lower jaw anterior, with a slight knob at its extremity. The third suborbital bone almost touches the preopercular ridge. *Barbels*—a short rostral pair, and sometimes rudimentary maxillary ones. *Teeth*—pharyngeal, crooked, pointed, 5, 4, 2/2, 4, 5. *Fins*—dorsal commences midway between the end of the snout and the base of the caudal fin, it extends to above the fourth or fifth anal ray. Caudal forked. *Scales*—15 rows before the base of the dorsal fin. *Colours*—back greenish, sides silvery, with a purplish tinge along the abdomen: a badly marked broad, steel-blue stripe, extends from behind the eye to the caudal fin, while it is bounded above and below by a narrow yellow edging. The *young* usually have light horizontal bands.

Habitat.—Rivers on the Neilgherry Hills, attaining $3\frac{1}{2}$ inches in length.

8. **Danio rerio**, Plate CLI, fig. 4.

Cyprinus rerio and *chapalio*, Ham. Buch. Fish. Ganges, pp. 323, 324, 390; Cuv. and Val. xvi, pp. 406, 416.
Perilampus striatus, McClell. Ind. Cyp. pp. 290, 397, pl. 46, f. 1 (from H. B.'s MSS.)
Nuria rerio, Bleeker, Beng. p. 62.
Barilius rerio, Günther, Catal. vii, p. 292.
Danio lineatus, Day, Proc. Zool. Soc. 1868, p. 198, and 1869, p. 378.
Poncha-geraldi. Ooriah.

B. iii, 9($\frac{2}{7}$), P. 13, V. 8, A. 15-16($\frac{2-3}{12-13}$), C. 19, L. l. 26-28, L. tr. 6.

Length of head 5 to $5\frac{1}{4}$, of caudal 4 to 5, height of body $4\frac{2}{3}$ to 5 in the total length. *Eyes*—diameter about 3 in length of head, 1/2 a diameter from end of snout, and 1 diameter apart. Lower jaw the longer. *Barbels*—rostral short, maxillary ones reaching the end of operele. *Teeth*—pharyngeal, crooked, pointed, 5, 3, 1/1, 3, 5. *Fins*—dorsal commences opposite the anal, and is situated in the middle of the total length: dorsal and anal highest anteriorly: caudal deeply forked. *Lateral-line*—absent. *Colours*—four metallic blue lines along the sides (separated by three narrow silvery ones), and forming three bands on the caudal fin. Dorsal with a blue edging. Anal with three longitudinal blue bands.

Habitat.—Bengal and as low down the Coromandel coast as Masulipatam. It attains to about 2 inches in length.

9. **Danio albolineata**, Plate CL, fig. 1.

Nuria albolineata, Blyth, J. A. S. of Bengal, 1860, p. 163.
Danio Stoliczkæ, Day, Proc. Zool. Soc. 1869, p. 621.

B. iii, D. 9($\frac{2}{7}$), P. 13, V. 7, A. 13-15($\frac{2}{11-13}$), C. 19, L. l. 31-33, L. tr. $5\frac{1}{2}$/3.

Length of head $4\frac{1}{2}$, of caudal $4\frac{1}{2}$ to 5, height of body from 4 to $4\frac{1}{2}$ in the total length. *Eyes*—diameter $2\frac{1}{2}$ to 3 in the length of head, 3/4 of a diameter from end of snout, and 1 apart. Body moderately compressed. Lower jaw anterior. Cleft of mouth very oblique, the maxilla extending to below the front edge of the orbit. *Barbels.*—maxillary reach beyond the base of the pectoral fin, rostral ones to the posterior margin of the orbit. *Teeth*—pharyngeal 5, 4, 2/2, 4, 5. *Fins*—dorsal commences slightly in advance of the anal, and rather nearer the base of the caudal than the snout. Caudal fin emarginate. *Lateral-line*—incomplete, $1\frac{1}{2}$ rows of scales between it and the base of the ventral fin: ,16 rows before the base of the dorsal fin. *Colours*—greenish superiorly: a scarlet band with a dark lower edge, commences from below the base of the dorsal fin, it gradually widens, and is continued to the centre of the base of the caudal. Dorsal margined with red. Anal with a yellow stripe along its centre.

Habitat.—Moulmein in tanks and streams. It attains two inches in length.

10. **Danio nigrofasciatus.**

Barilius nigrofasciatus, Day, Proc. Zool. Soc. 1869, p. 620.

B. iii, D. 9($\frac{2}{7}$), P. 15, V. 7, A. 13($\frac{2}{11}$), C. 19, L. l. 30-32, L. tr. 7.

Length of head 2/11, of caudal nearly 1/3, height of body 2/7 of the total length. *Eyes*—diameter nearly 1/2 of length of head, 1/4 of a diameter from end of snout, 1 diameter apart. *Barbels*—rostral absent; the maxillary pair extend to below the orbit. *Fins*—dorsal situated over the first portion of the anal, and midway between the posterior extremity of the orbit and the base of the caudal, which last is lunated. *Lateral-line*—absent. *Colours*—a dark band passing along the side of the body, and a second dotted line below it. Dorsal and anal spotted with black in lines. In some specimens the body is intensely blue.

Habitat.—Pegu and Moulmein. Out of 20 specimens none exceeded 7/10 of an inch in length.

B.—A portion or the whole of the abdominal edge trenchant.

a. Dorsal fin opposite the anal, which latter is elongated (9 to 21 *branched rays.*)

Genus, 26—PERILAMPUS, *McClelland.*

Chela, Swainson: *Laubuca*, Bleeker: *Cachius* and *Eustira*, Günther.

Pseudobranchiæ present. Body oblong, compressed, with a cutting abdominal edge. Mouth directed obliquely upward. Barbels absent. Pharyngeal teeth in three rows 5, 4 *or* 3, 2 *or* 1/1 *or* 2, 3 *or* 4, 5, *uncinate. Dorsal fin rather short, without any osseous ray, and commencing opposite or behind the origin of the anal, which last has many rays. Outer ventral ray elongated. Scales of moderate size. Lateral-line concave, passing to the lower half of the base of the caudal fin.*

Geographical distribution.—Fresh waters of India, Ceylon, and Burma.

SYNOPSIS OF SPECIES.

1. *Perilampus atpar*, D. 9, A. 22-24, L. l. 55-65. India generally, and Burma.
2. *Perilampus laubuca*, D. 9, A. 19-23, L. l. 34-37. Ganjam, Orissa, Bengal, Assam and Burma.
3. *Perilampus Ceylonensis*, D. 12, A. 17, L. l. 35. Ceylon.

11. Perilampus atpar, Plate CLI, fig. 6.

Cyprinus cachius and *atpar*, Ham. Buch. Fish. Ganges, pp. 258, 259, 384; Cuv. and Val. xvi, pp. 453, 454.
Chela atpar, Gray and Hard. Ill. Ind. Zool.
Perilampus cachius and *psilopteromus*, McClell. Ind. Cyp. pp. 289, 396, pp. 289, 396, pl. 46, f. 6, and f. 4, (from H. B.'s MSS.)
Chela anastoma, Swainson, Fishes, ii, p. 285.
Leuciscus atpar and *cachius*, Bleeker, Beng. p. 66.
Perilampus macropodus, Jerdon, M. J. L. and S. 1849, p. 325.
Paradanio elegans, Day, Proc. Zool. Soc. 1867, p. 297.
Cachius atpar, Günther, Catal. vii, p. 339.
Bonkuaso, Ooriah: *Nga-man-dan*, and *Ya-paw-nga* and *Nga-phyin-gyan*, Burmese; *Kachhi*, Beng.: *Mor-ri-ah*, Punj.: *Bi-dah*, Sind.

B. iii, D. 9($\frac{2}{7}$), P. 10, V. 5-6, A. 22-24($\frac{2}{18}$-$\frac{3}{21}$), L. l. 55-65, L. tr. 10-13/4.

Length of head $5\frac{1}{2}$ to 6, of caudal $4\frac{1}{2}$ to 5, height of body 4 to $4\frac{1}{4}$ in the total length. *Eyes*—diameter 3 to 4 in length of head, 3/4 of a diameter from end of snout, $1\frac{1}{2}$ diameters apart. Body strongly compressed, the abdominal edge being cutting. Cleft of mouth oblique, extending to nearly beneath the margin of orbit. *Teeth*—pharyngeal, 5, 4, 1/1, 4, 5, crooked, pointed. *Fins*—dorsal commences opposite the beginning of the second third of the anal. Pectoral elongate. Ventral with an elongated outer ray extending to the middle or even end of the anal fin. Caudal forked. *Lateral-line*—4 rows of scales between it and base of ventral fin. *Colours*—silvery, with a burnished lateral band. Dorsal and caudal fins yellow.

Habitat.—Sind, throughout India and Burma; attaining 4 inches in length.

2. Perilampus laubuca, Plate CLI, fig. 5.

Cyprinus laubuca and *? dancena*, Ham. Buch. Fish. Ganges, pp. 260, 342, 384, 393; Cuv. and Val. xvi, p. 456.
Perilampus guttatus and *? perseus*, McClell. Ind. Cyp. pp. 289, 394, 395, pl. 45, f. 4 (erroneously marked pl. lvi, f. 10, from H. B.'s MSS.) pl. 46, f. 5; Cuv. and Val. xvi, p. 469.
Cyprinus laubuca and *dancena*, Cuv. and Val. xvi, p. 456; Bleeker, Beng. pp. 68 and 138.
Perilampus fulvescens, Blyth, J. A. S. of B. 1860, p. 163; Day, Proc. Zool. Soc. 1869, p. 559.
Chela laubuca, Günther, Catal. vii, p. 335.
Laubuca guttata, Bleeker, Atl. Ich. Cyp. p. 33.
Perilampus laubuca, Day, Proc. Zool. Soc. 1869, pp. 380, 614.
Bankoe, Ooriah: *Nga-me-loung*, Burmese: *Layubuka* and *Dankena*, Beng.: *Dannahrah*, Hind.; *Moh-do-nee-konah* and *Her-bug-yi*, Assam: *Coon-che-li-e*, N. W. Prov.

B. iii, D. 10-11($\frac{2}{8}$-$\frac{2}{9}$), P. 13, V. 7, A. 19-23($\frac{2}{17}$-$\frac{2}{21}$), C. 19, L. l. 34-37, L. tr. 6-7/5.

Length of head 5 to 6, of caudal 5, height of body $3\frac{1}{2}$ to $4\frac{1}{4}$ in the total length. *Eyes*—diameter 3 to $3\frac{1}{2}$ in the length of head, 3/4 to 1 diameter from end of snout, $1\frac{1}{4}$ diameters apart. Body strongly compressed with

the abdominal edge cutting from below the pectoral to the anal fin. *Teeth*—pharyngeal, 5, 4, 1/1, 4, 5. *Fins*—dorsal arises midway between the hind edge of the orbit and the posterior extremity of the caudal fin, and slightly behind the origin of the anal. Pectoral reaching anal. Caudal deeply forked. *Lateral-line*—curved downwards, $3\frac{1}{2}$ rows of scales between it and the base of the ventral fin. *Colours*—silvery, with some golden vertical stripes during life. Fine dots over the body, and a black mark, shot with green, above the base of the pectoral fin, and another at the base of the caudal: the last third of the lobes of the caudal fin in some, especially Burmese specimens, are tipped with black. The black spot on the side of the tail is absent in some examples.

Habitat.—Ganjam, Orissa, Bengal, Central India, Assam and Burma; attaining at least $3\frac{1}{2}$ inches in length. The example figured was from Burma.

3. Perilampus Ceylonensis.

Eustira Ceylonensis, Günther, Catal. vii, p. 331.

B. iii, D. 12 ($\frac{2}{10}$), P. 17, V. 7, A. 17($\frac{2}{15}$), C. 19, L. l. 35, L. tr. $7\frac{1}{2}$/2.

Length of head 4, of caudal 4, height of body 4 in the total length. *Eyes*—diameter 1/3 of length of head, 3/4 of a diameter from end of snout. Posterior extremity of maxilla extends to below the anterior margin of the orbit: lower jaw the longer. *Fins*—origin of dorsal opposite commencement of anal. Pectoral reaching the ventral. *Colours*—uniform silvery.

Habitat.—Ceylon. The specimens in the British Museum are nearly 2 inches in length.

Genus, 27—CHELA,* *Ham. Buchanan.*

Oxygaster, v. Hass.; *Leuciscus*, sp. Cuv. and Val.: *Salmophasia*, Swainson; *Macrochirichthys* and *Paralaubuca*, Bleeker.

Body rather elongate and compressed: abdominal edge cutting. Pseudobranchiæ present. Mouth directed somewhat upwards, with the lower jaw prominent, and generally with a knob above the symphysis. Barbels absent. Pharyngeal teeth hooked and slender, in two or three rows. Dorsal fin short, without any osseous ray, situated principally or entirely opposite the anal, which latter has an elongated base. Pectorals long. Caudal forked. Scales of moderate or small size. Lateral-line concave.

Dr. Günther suggests the following sub-genera:

a. The trenchant thoracic edge anterior to the pectoral supported by the dilated bones of the forearm.—OXYGASTER.

α. Pharyngeal teeth in three rows. *Oxygaster.*
β. ,, ,, two ,, *Macrochirichthys.*

b. The thoracic edge not supported by the dilated bone of the forearm. *Securicula.*

Geographical distribution.—Sind, Continent of India, Burma, and extending to the Malay Archipelago.

Generally termed *Vellache-candee* in Tamil: *Bay-ree-saie* and *Baarsee*, Tel.: *Bounce-putti*, Ooriah: *Took*, Punjab.

It appears that several individual variations occur amongst the species belonging to this genus, not only in the number of anal rays, but also in the number of scales, as well as in that of the rows between the dorsal fin and the lateral-line. Irrespective of this the comparative width of the suborbital ring of bones to that of the uncovered portion of the cheek is liable to vary in examples of the same species.

SYNOPSIS OF SPECIES.

A.—Bones of forearm support the edge of thorax, (Oxygaster).

1. *Chela gora*, D. 9-10, A. 15-16, L. l. 140-160, L. tr. 18-20/18. Sind, Continent of India except its southern portion.

B.—Bones of forearm do not support the edge of thorax, (Securicula).

2. *Chela Sladoni*, D. 10, A. 20-21, L. l. 65-68, L. tr. 10/8. Irrawaddi river.

* Descriptions have been published by Hamilton Buchanan and Sykes, of some small fishes belonging to this genus, also to *Barilius*. As I am unable to recognize them with certainty, I place them in this note:—

1. *Cyprinus hoalius*, Ham. Buch. "Fish. Ganges," pp. 336, 392; Cuv. and Val. xvi, p. 442. *Leuciscus hoalius*, Bleeker, Beng. p. 68. D. 9, V. 9, A. 10. Much compressed. Green above, silvery below. Northern Bengal to 5 inches in length.

2. *Cyprinus borelio*, Ham. Buch. l. c. pp. 336, 392; Cuv. and Val. xvi, p. 443. *Leuciscus borelio*, Bleeker, Beng. p. 66. D. 9, V. 8, A. 11, C. 18. Long and compressed. Silvery above tinged with green: deep yellow below. Eyes silvery. Gangetic Provinces, to 4 inches. This may belong to genus *Barilius*, and be the young of *B. bendelisis*.

3. *Cyprinus solio*, H. Buch. l. c.; Cuv. and Val. xvi, p. 444. *Leuciscus solio*, Bleeker, Beng. p. 68. D. 9, V. 8, A. 11. Only differs from last in colour of belly. Kosi river. This and the last are probably the same.

4. *Chela jorah*, Sykes, "Transactions, Zool. Soc." ii, p. 361. *Leuciscus jorah*, Bleeker, Beng. p. 68; Jerdon, Madras J. L. and Sc. 1849, p. 323. D. 10, P. 12, V. 8, A. 11, C. 18. Compressed fish. Back dark, with purplish shade, sides and abdomen silvery. Beema river, near Pairgaon in the Deccan.

5. *Chela alkootee*, Sykes, l. c. p. 362. *Leuciscus alkootee*, Bleeker, Beng. p. 66; Jerdon, l. c. p. 324. D. 10, P. 10, V. 7, A. 10. Sides slightly compressed, back and belly rounded (?); back straight. Scales very minute. Lateral-line quite straight (?). Silvery, with a black circle round the eye. Deccan, to 1 inch in length.

3. *Chela sardinella*, D. 9, A. 21, L. l. 48, L. tr. $7\frac{1}{2}/4$. Burma.
4. *Chela untrahi*, D. 9, A. 17-19, L. l. 55-65, L. tr. 8-9/5. Orissa, Madras.
5. *Chela argentea*, D. 9-10, A. 17-19, L. l. 43-45, L. tr. $6\frac{1}{2}$-7/3. Southern India.
6. *Chela Punjabensis*, D. 9, A. 16-17, L. l. 90-110, L. tr. 12/9. Punjab and Sind.
7. *Chela phulo*, D. 9, A. 19-20, L. l. 80-90, L. tr. 12-15/6. Continent of India.
8. *Chela boopis*, D. 9-10, A. 14-15, L. l. 38-40, L. tr. 6-$6\frac{1}{2}$/3. South Canara.
9. *Chela clupeoides*, D. 9, A. 13-15, L. l. 80-93, L. tr. 12-15/6. Cutch, Nerbudda river, Deccan, southern India and Burma.
10. *Chela bacaila*, D. 9, A. 13-15, L. l. 86-110, L. tr. 17-19/6. Sind, India (except portions of the Deccan, western coast and south of the Kistna) also Assam, and perhaps Burma.

A.—*Bones of forearm support the edge of thorax (Oxygaster).*

1. **Chela gora**, Plate CLI, fig. 8.

Cyprinus gora, Ham. Buch. Fish. Ganges, pp. 263, 384; Cuv. and Val. xvi, p. 458.
Opsarius pholicephalus, McClell. Ind. Cyp. pp. 295, 415, pl. 47, fig. 2.
Leuciscus ghora, Cuv. and Val. xvi, p. 458; Bleeker, Beng. p. 68.
Chela gora, Günther, Catal. vii, p. 332; Day, Proc. Zool. Soc. 1869, p. 381.
Hum-catchari, Ooriah.: *Ghora chela*, Beng.: *Chel-hul*, Hind.: *Bounchi* and *Kundul*, Punj.

B. iii, D. 9-10($\frac{2}{7}$-^{3}), P. 15, V. 8, A. 15-16($\frac{2}{13-14}$), C. 19, L. l. 140-160, L. tr. 18-20/18, Vert. 46.

Length of head 5 to $5\frac{1}{4}$, of caudal 6 to $6\frac{1}{2}$, height of body 6 in the total length. *Eyes*—diameter 1/5 of length of head, $1\frac{1}{2}$ diameters from end of snout, $1\frac{1}{4}$ diameters apart. The bones of the forearm support the thoracic edge, the keeled portion of the abdominal profile commences posterior to the ventral fin. Suborbital ring of bones broader than the diameter of the eye, but only covering two-thirds of the cheek. *Teeth*—pharyngeal, 5, 3, 1/1, 3, 5. Gill-rakers very short, 8 in the lower branch of the outer branchial arch. *Fins*—dorsal commences slightly in advance of the anal, and in the last 1/3 of the distance between the hind edge of the preopercle and the base of the caudal fin. Pectoral 1/3 longer than the head. *Scales*—extend forwards on the head to above the nostrils. *Colours*—silvery.

Habitat.—Sind, Punjab, N. W. Provinces, Bengal, Orissa, and Assam. It attains at least 9 inches in length.

B.—*Bones of forearm do not support the edge of thorax (Securicula).*

2. **Chela Sladoni**, Plate CLII, fig. 3.

Day, Proc. Zool. Soc. 1869, p. 622.

B. iii, D. 10($\frac{2}{8}$), P. 11, V. 8, A. 20-21($\frac{2}{18-19}$), C. 21, L. l. 65-68, L. tr. 10/8.

Length of head 6 to $6\frac{1}{4}$, of caudal 5, height of body 5 to $5\frac{1}{2}$ in the total length. *Eyes*—diameter $3\frac{1}{3}$ to $3\frac{1}{2}$ in the length of head, 3/4 of a diameter from end of snout. Posterior extremity of the maxilla reaches to beneath the anterior third of the orbit. Suborbital ring of bones is half as deep as the diameter of the orbit, and 2/3 wider than the uncovered portion of the cheek below it. Thoracic edge not supported by dilated bones of the forearm. The serrated abdominal margin commences opposite the base of the pectoral fin. *Teeth*—pharyngeal, crooked 5, 4, 2/2, 4, 5. *Fins*—dorsal commences opposite the anal. Pectoral as long as the head but does not reach the ventral: lower caudal lobe the longer. *Colours*—silvery, caudal black edged.

Habitat.—Irrawaddi in Burma, extending northwards as far as Mandalay.

3. **Chela sardinella**, Plate CLII, fig. 1.

Leuciscus sardinella, Cuv. and Val. xvii, p. 344.
Chela sardinella, Günther, Catal. vii, p. 338.
Nga-koon-nyat, Burm.

B. iii, D. 9($\frac{2}{7}$), P. 13, V. 8, A. 21($\frac{2}{19}$), L. l. 48, L. tr. $7\frac{1}{2}/4$.

Length of head 6, of caudal 6, height of body $5\frac{1}{3}$ to 6 in the total length. *Eyes*—diameter $3\frac{1}{2}$ to 4 in the length of head, 1 diameter from end of snout, nearly 1 diameter apart. The maxilla extends to below the front edge of the eye. The bones of the forearm are not dilated and do not support the thoracic edge which is smooth, the keeled portion commences opposite the pectoral fin. Suborbital ring of bones broad, but do not touch the preopercular ridge. *Teeth*—pharyngeal, 5, 4, 3/3, 4, 5. *Fins*—dorsal commences above or slightly behind the origin of the anal. The pectoral does not reach the ventral, nor the latter the anal. Caudal deeply forked, the lower lobe the longer. *Colours*—silvery.

Habitat.—Irrawaddi river at Rangoon, also the Salwein at Moulmein. It attains to at least 6 inches in length.

4. **Chela untrahi**, Plate CLI, fig. 7.

Day, Proc. Zool. Soc. 1869, p. 381.
Untrahi, Ooriah.

B. iii, D. 9($\frac{2}{7}$), P. 13, V. 7, A. 17-19($\frac{2-3}{14-17}$), C. 17, L. l. 55-65, L. tr. 7-9/5.

Length of head $5\frac{1}{2}$ to 6, of caudal 5 to $5\frac{1}{2}$, height of body $5\frac{1}{4}$ to 6 in the total length. *Eyes*—upper margin near the profile, diameter 3 to $3\frac{1}{4}$ in the length of head, 2/3 of a diameter from end of snout, nearly 1 diameter apart. Dorsal profile nearly horizontal: abdominal profile with a cutting edge from opposite the base of the pectoral fin. Mouth very oblique, knob on symphysis minute. Lower jaw in advance of the upper, the maxilla extending to below the anterior margin or first third of the orbit. Suborbital ring of bones wide, but they do not touch the preopercular ridge. Thoracic edge smooth and not supported by dilated bones of forearm. *Fins*—pectorals 1/3 longer than the head, reaching ventrals. Dorsal arises midway between the posterior margin of the orbit and the posterior extremity of the caudal fin: anal commences below the middle of the dorsal fin. Caudal lobed, the lower lobe the longer. *Scales*—deciduous, extending forwards on the nape to opposite the middle of the orbit. *Lateral-line*—curves downwards, 1 row of scales between it and base of ventral fin: 47 rows before the base of the dorsal fin. *Colours*—silvery.

At one time I thought this might be *Pelecus flavipinnis*, Jerdon, M. J. L. and Sc. 1849, p. 327, but his MS. figure looks more like *Chela clupeoides*.

Habitat.—Mahanuddi river in Orissa, also the Cauvery and Coleroon in Southern India. It attains at least eight inches in length.

5. **Chela argentea**, Plate CLII, fig. 2.

Leuciscus acinaces, Cuv. and Val. xvii, pl. 509 (not descrip. p. 347).
? Pelecus diffusus, Jerdon, M. J. L. and S. 1849, p. 327.
Chela argentea, Day, Proc. Zool. Soc. 1867, p. 301: Günther, Catal. vii, p. 334.
? Chela diffusa, Günther, Catal. vii, p. 334.
Chaya-vellachee or *Vellachee-cundee*, Tam. "The white carp."

B. iii, D. 9-10($\frac{2-3}{7-8}$), P. 15, V. 8, A. 17-19($\frac{3}{14-16}$), C. 19, L. l. 43-45, L. tr. $6\frac{1}{2}$-7/3.

Length of head $5\frac{1}{2}$ to $5\frac{2}{3}$, of caudal $5\frac{1}{2}$ to $5\frac{2}{3}$, height of body 5 to $5\frac{1}{2}$ in the total length. *Eyes*—diameter $3\frac{1}{2}$ in length of head, 1 diameter from end of snout and also apart. Cleft of mouth extending to below the anterior third of the orbit, a knob above symphysis of the lower jaw. Suborbital ring of bones broad and nearly covering the cheek, the third almost touching the preopercular ridge. The thoracic edge in front of the pectoral fins is not supported by the dilated bones of the forearm, and is without a sharp edge. *Teeth*—pharyngeal, curved, pointed, 5, 3, 2/2, 3, 5. *Fins*—dorsal situated in the posterior third of the distance between the snout and the base of the caudal fin, and over the commencement of the anal. Dorsal and anal highest anteriorly. Pectoral reaches the ventral. Caudal deeply lobed. *Lateral-line*—descends gently for the first twelve scales, finally attaining the centre of the caudal: $1\frac{1}{2}$ rows of scales between it and the base of the ventral fin: 27 to 30 rows anterior to the dorsal fin. Free portion of tail 1/2 longer than high at its base. *Colours*—silvery, with a lateral band which fades after death: caudal dark edged, as is also occasionally the anal.

Dr. Jerdon gives about 50 scales in *C. diffusa* along the side, and observes that his species is found in the Cauvery and all its tributaries. I did not obtain it in the lower portions of the Cauvery, but *C. argentea* was likewise absent, and I suspect the two are identical.

The specimen shown me at Paris as the type of *Chela acinaces* is the above species, and agrees with Cuv. and Val. figure, except in the number of the anal rays. The diameter of the eye is $3\frac{1}{4}$ in the length of the head (not $2\frac{1}{2}$ as stated in the text), whilst the anal fin has 16 not 13 rays. The description may perhaps refer to *C. boopis*, but that fish does not seem to be found in Mysore.

Habitat.—Bowany river at the base of the Neilgherries, Cauvery river and Mysore attaining 6 inches in length.

6. **Chela Punjabensis**, Plate CLIII, fig. 2.

Day, Journ. As. Soc. of Bengal, pt. ii, 1872, p. 25.
Took, Punj.

B. iii, D. 9($\frac{2}{7}$), P. 11, V. 6, A. 16-17($\frac{2-3}{14-15}$), C, 19, L. l. 90-110, L. tr. 12/9.

Length of head 6, of caudal 6, height of body $4\frac{1}{2}$ to 5 in the total length. *Eyes*—diameter $2\frac{1}{2}$ to $2\frac{2}{3}$ in length of head: 1/2 a diameter from end of snout. The posterior extremity of the maxilla extends to nearly beneath the anterior margin of the orbit. Lower jaw the longer. The suborbital ring of bones broad, and the third three times as deep as the uncovered portion of the cheek below it. Dorsal profile nearly horizontal: abdominal edge cutting from opposite the base of the pectoral fin. Edge of thorax not supported by dilated bones of the forearm. *Fins*—dorsal arises midway between the posterior margin of the opercle, and the posterior extremity of the lobes of the caudal. Pectoral longer than the head, but does not quite reach the base of the ventral, which last fin only extends half the distance to the anal: the latter commences opposite

the origin of the dorsal. Lower lobe of caudal the longer. *Scales*—moderately deciduous, they extend forwards to opposite the suborbital ring of bones: there is a slight elevation along the centre of each: $5\frac{1}{2}$ rows between the lateral-line and the base of the ventral fin. *Colours*—silvery, with a burnished silvery band along the side. Cheeks tinged with pink.

Habitat.—Lahore, in the Ravi river, also the Indus in Sind. It attains at least $2\frac{1}{2}$ inches in length.

7. **Chela phulo**, Plate CLIII, fig. 1.

Cyprinus phulo, Ham. Buch. Fish. Ganges, pp. 262, 384; Cuv. and Val. xvi, p. 457.
Opsarius albulus, McClelland, Ind. Cyp. pp. 296, 416, pl. 48, fig. 10.
Chela Owenii, Sykes, Trans. Zool. Soc. 1841, p. 361, pl. 63, fig. 1.
Leuciscus phula, Bleeker, Beng. p. 68.
Leuciscus Owenii, Bleeker, l. c.
Pelecus Owenii, Jerdon, M. J. L. and S. 1849, p. 328.
Chela phulo, Günther, Catal. vii, p. 334; Day, Proc. Zool. Soc. 1869, p. 381.
Phul chela, Beng.; *Dunnahree*, Hind.; *Took* and *Bung-ka-charl*, Punj.; *Muk-ka*, Sind.; *Sel-konuh*, Assam.

B. iii, D. $9(\frac{2}{7})$, P. 13, V. 9, A. $18\text{-}19(\frac{2-3}{16-16})$, C. 19, L. l. 80-87, L. tr. 12-15/6.

Length of head $5\frac{1}{2}$, of pectoral 5, of caudal 5, height of body $4\frac{1}{2}$ to 5 in the total length. *Eyes*—diameter $3\frac{1}{2}$ in length of head, 1/2 a diameter from end of snout, 1 diameter apart. Abdominal profile cutting behind the base of the pectoral fin. Third suborbital bone nearly as deep as the uncovered portion of the cheek below it. The maxilla extends to under the front margin of the orbit. The thoracic edge is not supported by the dilated bones of the forearm. *Fins*—dorsal commences midway between the posterior extremity of the orbit and the posterior extremity of the caudal fin, and opposite the origin of the anal. Caudal deeply forked, lower lobe the longer. *Lateral-line*—curves gently downwards. *Colours*—silvery, with a bright silvery lateral band.

There is a variety in Upper Assam with more rows of scales along the lateral-line, 100-110, and rather a more pointed head.

Habitat.—Assam, Bengal, Orissa, Central India and the Deccan as far southwards as the Tamboodra and Kistna rivers; attaining 5 inches or more in length.

8. **Chela boopis**, Plate CLII, fig 4.

? *Leuciscus acinaces*, Cuv. and Val. xvii, p. 347 (not pl. 509).
Chela boopis, Day, Proc. Zool. Soc. 1873, p. 708.

B. iii, D. $9\text{-}10(\frac{2-3}{7})$, P. 15, V. 9, A. $14\text{-}15(\frac{2-3}{12-13})$, C. 21, L. l. 38-40, L. tr. $6\text{-}6\frac{1}{2}/3$.

Length of head $5\frac{1}{4}$ to $5\frac{1}{2}$, of caudal $5\frac{1}{2}$, height of body 5 to $5\frac{1}{4}$ in the total length. *Eyes*—diameter $2\frac{1}{2}$ to 3 in the length of the head, 3/4 of a diameter from the end of snout and also apart. Cleft of the mouth extends to beneath the front edge of the orbit. Suborbital ring of bones almost covers the cheek. The dilated bones of the forearm do not support the thoracic edge, which is not sharp. *Fins*—dorsal commences slightly in advance of the anal, but extends to over it. Caudal deeply forked. *Lateral-line*—2 to $2\frac{1}{2}$ rows of scales between it and the base of the ventral fin: 22 to 24 rows before the dorsal fin. *Colours*—silvery, with a burnished lateral band: dorsal caudal, and anal edged with black.

This differs from *C. argentea*, in having fewer scales, a larger eye and less deeply cleft mouth.

Habitat.—South Canara and ? Mysore; attaining at least 5 inches in length.

9. **Chela clupeoides.**

Cyprinus clupeoides, Bloch, xii, p. 49, t. 408, fig. 2.
Clupea cyprinoides, Bloch, Schn. Syst. Ich. p. 427.
Chela balookee and ? *teekaree*, Sykes, Trans. Zool. Soc. ii, p. 360, 362.
Leuciscus clupeoides and *Dussumieri*, Cuv. and Val. xvii, p. 342, pl. 508.
Leuciscus belookee and ? *teekaree*, Bleeker, Beng. p. 68.
Pelecus affinis, Jerdon, M. J. L. and S. 1849, p. 327.
? *Perilampus teekanee*, Jerdon, l. c. p. 326.
Chela clupeoides, Günther, Catal. vii, p. 333.
Netteli. Tam.

B. iii, D. $9(\frac{2}{7})$, P. 13, V. 9, A. $13\text{-}15(\frac{2}{11-13})$, C. 19, L. l. 80-93, L. tr. 12-15/6.

Length of head $5\frac{1}{2}$ to $5\frac{3}{4}$, of caudal $5\frac{1}{2}$ to $6\frac{1}{4}$, height of body $5\frac{1}{2}$* in the total length. *Eyes*—diameter 4 in the length of head, 1 diameter from end of snout, 3/4 of a diameter apart. A well developed knob on symphysis: suborbital ring of bones wide, the third 4/5 as deep as the uncovered portion of the cheek below it. Thorax, which has a smooth edge, is not supported by any dilated bones of the forearm. *Teeth*—pharyngeal, 5, 4, 2/2, 4, 5. *Fins*—dorsal situated in the posterior 2/5 of the body, and 1/2 in advance of the

* In some badly nourished examples I have seen the height of the body only equal to $7\frac{1}{2}$ in the total length. Such are common at Madras in the dirty Coom river.

anal. Pectoral 1/4 longer than the head, but does not reach the ventral. Caudal lobed, the lower lobe the longer. *Scales*—deciduous and placed in sinuous rows: those on upper surface of the head extend forwards to opposite the hind edge of the orbit. *Lateral-line*—2 rows of scales between it and the base of the ventral fin. *Colours*—silvery.

This species or variety is closely allied to *C. bacaila*, from which it is chiefly divided by the number of scales. In Cutch I found A. ($\frac{2}{11-13}$), L. l. 83-92, L. tr. 13-14/6: at Jubbulpore on the Nerbudda, A. ($\frac{2}{12-13}$), L. l. 80-90, L. tr. 14-15/6: in the Deccan, A. ($\frac{2}{13-15}$), L. l. 84-93, L. tr. 13/6: at Madras, A. ($\frac{2}{11-13}$), L. l. 80-87, L. tr. 12-15/6: to the South of Madras at the Cauvery river, A. ($\frac{2}{12-13}$), L. l. 80-91. L. tr. 14-15/6. See remarks under next species, *C. bacaila*.

Leuciscus novacula, Val. in Jacq. Voy. Ind. Orient. pl. xv, f. 2; Cuv. and Val. xvii, p. 345; Bleeker, Beng. p. 69, and *Chela novacula*, Günther, Catal. vii, p. 334, appears to be this species. The type specimen has L. l. 80 (not 60, as given in Cuv. and Val.)

Habitat.—Cutch, Jubbulpore, Mysore, the Deccan, Madras Presidency, and Burma. It attains at least 6 inches in length, and is very good eating.

10. Chela bacaila, Plate CLII, fig. 5.

Cyprinus bacaila, Ham. Buch. Fish. Ganges, pp. 265, 384, pl. 8, fig. 76; Cuv. and Val. xvi, p. 460.
Opsarius bacaila and *leucerus*, McClell. Ind. Cyp. pp. 295, 414, 415, pl. 47, fig. 3; Cuv. and Val. xvi, p. 470.
Leuciscus cultellus and *bacaila*, Cuv. and Val. xvii, p. 341, pl. 507; Bleeker, Beng. pp. 66, 137.
Salmophasia oblonga, Swainson, Fishes, ii, p. 284.
Pelecus cultellus, Jerdon, M. J. L. and S. 1849, p. 326.
Chela bacaila, Günther, Catal. vii, p. 332; Day, Proc. Zool. Soc. 1869, p. 382.
Jellahri, Ooriah: *Chelliah*, Hind.

B. iii, D. 9($\frac{2}{7}$), P. 13, V. 9, A. 13-15($\frac{2}{11-13}$), C. 19, L. l. 86-110, L. tr. 17-19/6-10.

Length of head $5\frac{1}{4}$ to 6, of caudal $5\frac{1}{4}$, height of body $5\frac{1}{2}$ to 6 in the total length. *Eyes*—$3\frac{1}{2}$ to $3\frac{3}{4}$ in length of head, snout slightly longer than the eye: eyes 1 diameter apart. Bones of the forearm not dilated, and not supporting the abdominal edge anterior to the pectoral fin. Cleft of mouth reaches to below the first fourth of the eye. Suborbital ring of bones broad, nearly covering the cheek. *Teeth*—pharyngeal 5, 4, or 3, 2/2, 3, or 4, 5. *Fins*—first anal ray is below the middle of the dorsal fin: pectoral nearly reaches the ventral, whilst the latter does not quite extend to the anal. *Scales*—extend forwards on the head to nearly opposite the posterior margin of the orbit. *Colours*—uniform silvery.

Under *C. clupeoides*, I observed that, excluding the Nerbudda river and Cutch, it is a southern form, but is also found in Burma. This species or variety is restricted more to the Valley of the Ganges and its affluent streams, also to the Punjab and down the Indus. It is distinguished by the large number of its scales, which I have found as follows: Assam, A. $\frac{2}{13-14}$, L. l. 102-108, L. tr. 18/6; Sone river, A. $\frac{2}{12}$, L. l. 98, L. tr. 18/6: Orissa, A. $\frac{2}{13-14}$, L. 86-98, L. tr. 14-18/6 (some of these appeared to be intermediate forms between this species and the last); Calcutta, A. $\frac{2}{11-13}$, L. l. 90-110, L. tr. 17-19/6; Seharunpore, A. $\frac{2}{11-12}$, L. l. 95-100, L. tr. 18-19/6: Sind, A. $\frac{2}{11-12}$, L. l. 92-96, L. tr. 17-19/6. One specimen from Bezwarah had A. $\frac{2}{15}$, L. l. 95, L. tr. 12/6.

Habitat.—Throughout India except Malabar, Mysore, and Madras, and parts of the Deccan. Dr. Günther gives Moulmein as one of its localities. It attains at least 7 inches in length.

FAMILY, V—CYPRINIDÆ.*

SYNOPSIS OF GENERA.

Sub-Family, I—Cyprinina.

1. Air vessel when present, not enclosed in bone.

A.—Abdomen rounded not trenchant.

a. Dorsal fin commencing nearly opposite the ventrals. Anal short (5 to 7 branched rays).

1. *Homaloptera.* Anterior portion of body depressed: snout spatulate: mouth on lower surface of head: 6 barbels. Pharyngeal teeth in one row. Outer pectoral rays unbranched, or simply bifurcated. Scales small. Himalayas and Western ghauts in India, Java and Sumatra, p. 525.

2. *Psilorhynchus.* Anterior portion of body somewhat depressed: snout rather spatulate. Mouth inferior: no barbels. Outer pectoral rays unbranched. Scales of moderate size. Hill streams and rivers in Bengal and Assam, p. 526.

3. *Discognathus.* Mouth inferior, with a suctorial disk on the chin: 4 barbels. Pharyngeal teeth in 3 rows. Scales of moderate size. Pectoral fins sub-horizontal. India, Ceylon, and Burma, also Aden and Abyssinia, p. 527.

* As part iii. of this work, ending p. 552, was published in 1877, a synopsis of the CYPRINIDÆ had to be deferred until the present number: otherwise it would have been inserted at p. 524, immediately after the definition of the Family.

4. *Oreinus.* Mouth inferior, with the mandibles loosely joined together: a suctorial disk on the chin: 4 barbels. Pharyngeal teeth in 3 rows. Scales small, with the vent and base of anal fin enclosed by a tiled row. Last undivided dorsal ray osseous and may be serrated. Himalayan and sub-Himalayan range, extending to the confines of China, p. 529.

5. *Schizopygopsis.* Mouth inferior: mandibles with a sharp horny covering. No barbels. Pharyngeal teeth in two rows. A serrated dorsal ray. Scales present in scapular region, a tiled row enclosing vent and base of anal fin. Tibet and Turkestan, p. 531.

6. *Schizothorax.* Mouth antero-inferior: four barbels. Pharyngeal teeth in three rows. A serrated dorsal ray. Scales small: vent and base of anal fin enclosed in a tiled row. Himalayan region, Afghanistan and Turkestan, p. 531.

7. *Ptychobarbus.* Mouth anterior or inferior: two barbels. Pharyngeal teeth in two rows. Dorsal with or without a feeble osseous ray, which is sometimes serrated. Scales small: vent and base of anal fin enclosed in a tiled row. Head waters of Indus, Tibet and Kashgar, p. 533.

8. *Diptychus.* Mouth inferior: lower jaw with a horny covering: two barbels. Pharyngeal teeth in two rows. Dorsal fin without any osseous ray. Scales small, not imbricated: a sheath to vent and base of anal fin. Tibet, Nepaul, and Yarkand, p. 534.

9. *Labeo.* Mouth anterior or inferior: lips thick, those of the two jaws continuous at the angle, and one or both with an inner fold: sometimes a lateral lobe to the snout: barbels, four, two, or none. Pharyngeal teeth in three rows. Dorsal fin rather or very elongated and without any osseous ray. Scales large, of moderate size, or small. Africa, Syria, India, Ceylon, and Burma to the Malay Archipelago, p. 534.

10. *Osteochilus.* Differs from *Labeo* in its lips being reflected from off the mandible leaving it uncovered as a sharp, hard, transverse prominence. Burma and the Malay Archipelago, p. 545.

11. *Dangila.* Snout somewhat depressed: mouth more or less inferior: upper lip fringed: lower jaw sharp, covered by a thin lip, and with a tubercle above the symphysis: barbels four or two. Pharyngeal teeth in three rows. Dorsal fin elongated and without any osseous ray. Scales large, of moderate size, or small. Burma to the Malay Archipelago, p. 546.

12. *Cirrhina.* Mouth transverse: snout somewhat depressed: lips thin, those of the two jaws not continuous, a small tubercle above the symphysis of the lower jaw. Barbels four, two, or none. Pharyngeal teeth in three rows Dorsal fin short or of moderate length, without any osseous ray. Scales large, of moderate size, or small. Beloochistan, Sind, India, Burma, and Malay Archipelago, p. 547.

13. *Semiplotus.* Snout thick: mouth inferior, with a knob at the symphysis: no barbels. Pharyngeal teeth in three rows. Dorsal fin long, with a strong osseous ray that is serrated or entire. Scales large. Assam, Chittagong hills, and Burma, p. 549.

14. *Scaphiodon.* Snout rounded: mouth transverse, inferior: a horny layer inside lower jaw which is not covered by lip: four, two, or no barbels. Pharyngeal teeth in three rows. Dorsal fin of moderate extent, with its last undivided ray articulated, or else osseous and serrated, or entire. Scales of varying size. Western Asia, Sind, Western ghauts of India, p. 550.

15. *Carassius.* Mouth anterior: lips thin: no barbels. Pharyngeal teeth in one row. Dorsal fin long, with an osseous serrated ray. Scales of moderate size. Temperate portions of Europe and Asia, ? India, p. 552.

16. *Catla.* Head broad: snout with thin integuments: lower lip with a continuous transverse fold: lower jaw with a moveable articulation at the symphysis: gill-rakers long: no barbels. Pharyngeal teeth in three rows. Dorsal rather long, without any osseous ray. Scales of moderate size. Sind, India (except its southern portion) Assam, Burma, and Siam, p. 553.

17. *Thynnichthys.* Upper lip absent: mouth antero-lateral: no barbels. Pharyngeal teeth molariform, compressed, and in 3 rows. Dorsal fin without any osseous ray and inserted opposite the ventral. Scales small, lateral-line complete. Deccan, Kistna and Godavery rivers, also the Malay Archipelago, p. 554.

18. *Amblypharyngodon.* Differs from *Thynnichthys* in having the crowns of its pharyngeal teeth flat or concave: the dorsal fin extending to nearly or quite above the anal: and the lateral-line incomplete. Sind, India, Ceylon, and Burma, p. 554.

19. *Barbus.* Mouth anterior or inferior: jaws closely invested by lips, which may or may not have leathery lobes: four, two, or no barbels. Pharyngeal teeth in three rows. Dorsal fin short, with its last undivided ray articulated or osseous, which last may be serrated or entire. Scales of large, moderate, or small size. Lateral-line complete or incomplete. Europe, Asia and Africa, p. 556.

b. Dorsal fin commencing very distinctly posterior to the ventrals, but not extending to above the anal, which last is short or of moderate length (5 to 11 branched rays).

20. *Nuria.* Mouth narrow, directed obliquely upwards: four barbels, the maxillary pair very long. Pharyngeal teeth in one row. Dorsal fin without osseous ray. Scales of moderate size. India, Ceylon, Burma and Nicobar islands, p. 582.

21. *Rasbora.* Mouth oblique, lower jaw with one central and on either side a lateral prominence fitting into corresponding emarginations in the upper jaw: a pair of rostral barbels or none. Pharyngeal teeth in three rows. Dorsal fin without any osseous ray. Scales large or of moderate size. Africa, India, Ceylon, Assam, Burma, to the Malay Archipelago, p. 583.

22. *Aspidoparia.* Mouth small, inferior: lower jaw with a sharp crescentic edge but no lip: no barbels. Pharyngeal teeth in two or three rows. Dorsal fin without osseous ray. Scales of moderate size. Sind, India (except southern portion and Malabar Coast) Assam and Burma, p. 585.

c. Dorsal fin commencing above the interspace between the ventral and the anal, generally extending to over the latter, which is of moderate length or elongated (7 to 33 branched rays).

23. *Rohtee.* Mouth anterior: lips thin. Barbels present or absent. Pharyngeal teeth in three rows. Dorsal fin with an osseous serrated ray: anal elongated. Scales small. Sind, India, and Burma, p. 586.

24. *Barilius.* Mouth anterior or oblique, with a deep cleft: jaws compressed: four, two, or no barbels. Pharyngeal teeth in two or three rows. Dorsal fin without osseous ray. Scales of moderate or small size. Lateral-line concave. Nile, East Africa, and fresh waters of India, Ceylon, and Burma to the Malay Archipelago. p. 588.

25. *Danio.* Mouth directed obliquely upwards: cleft shallow: mandibles rather broad: four, two, or no barbels. Pharyngeal teeth in three rows. Dorsal fin without osseons ray and extending to above a long anal. Scales of moderate size. Lateral-line concave. Continent of India and Burma, p. 594.

B.—A portion or the whole of the abdominal edge trenchant.

26. *Perilampus.* Mouth directed obliquely upwards: no barbels. Pharyngeal teeth in three rows. Dorsal fin without osseous ray, inserted over the anterior anal rays. Scales of moderate size. Lateral-line concave. India and Burma, p. 598.

27. *Chela.* Mouth directed upwards with a knob above the symphysis of the lower jaw: no barbels. Pharyngeal teeth in two or three rows. Dorsal fin without osseous ray, a portion or the whole of it situated above the anal: pectorals long. Scales of moderate or small size. Lateral-line concave. India and Burma to the Malay Archipelago, p. 599.

B. Sub-Family, II—Cobitidina.

Pseudobranchiæ absent. Body elongated, oblong, compressed or cylindrical, but never depressed. Snout and lips fleshy. Mouth small, inferior, and furnished with from six to twelve barbels. Pharyngeal teeth few and in one row. Vertical fins spineless. Dorsal fin with a varying number of rays (8-30); anal with few (7-8); ventrals present or absent. Scales small and cycloid when present, and usually immersed in mucus: rarely present on the head. Lateral-line single. Air-vessel entirely, or partially, enclosed in a bony capsule.

Geographical distribution.—Loaches are found in tanks and rivers throughout the hills and plains of India and Burma, but apparently are absent from the Andaman islands. These fish are mostly captured by baling out tanks commencing to dry up, but as they move about in the mud, they are usually difficult to capture.

Uses.—They are all good for food.

SYNOPSIS OF GENERA.

A.—*With an erectile spine near the orbit.*

1. *Botia.* Six to eight barbels, four rostral, two maxillary, and sometimes two mandibular. Spine suborbital. No scales on head. Dorsal fin (10 to 15 rays) commencing somewhat before the origin of the ventral: caudal forked. Air-bladder in two portions, the anterior being partially enclosed in bone. Sind, Valley of Ganges, Himalayas, Assam, Burma to the Malay Archipelago, p. 606.

2. *Acanthopsis.* Eight barbels, two being mandibular. Spine before the orbit. Dorsal fin (12 rays) opposite the ventrals: caudal forked. No scales on head. Burma to the Malay Archipelago, p. 608.

3. *Somileptes.* Six barbels, none on mandibles. Eyes prominent. Spine suborbital. Dorsal fin (10 rays) commences slightly behind the ventrals: caudal entire. No scales on the head. Himalayas, Khasia hills, and Assam, p. 608.

4 *Lepidocephalichthys.* Eight or more barbels, four rostral, two maxillary, the rest mandibular. Spine suborbital. Dorsal fin short, commences nearly opposite the ventrals: caudal entire or slightly emarginate. Scales on the head. Continent of India, Ceylon, Assam, Burma to the Malay Archipelago, p. 609.

5. *Acanthophthalmus.* Six barbels, one rostral, and two maxillary pairs. Spine suborbital. Dorsal fin short, in the last third of the body, but anterior to the anal: ventrals present. N. E. India, Assam, and upper Burma, p. 610.

6. *Apua.* Eight barbels, one rostral, two maxillary and one mandibular pairs. Spine suborbital. Dorsal fin short (8 rays) in the last third of the body, but anterior to the anal: no ventrals. Burma, p. 611.

7. *Jerdonia.* Eight barbels, two being mandibular. Spine suborbital. Dorsal fin long (30 rays) commencing anterior to the ventral. Madras, p. 611.

B.—*Without an erectile spine near the orbit.*

8. *Nemachilichthys.* Six barbels, two rostral, and one maxillary pairs. Snout elongated. Eyes elevated. Dorsal fin of moderate length (13 rays) above the ventrals: caudal forked. Deccan, p. 611.

9. *Nemacheilus.* Six barbels, two rostral and one maxillary pairs. Dorsal of moderate length or short (8 to 17 rays) commencing opposite the ventrals. Sind, India, Ceylon, Assam, Burma, and the Malay Archipelago, p. 612.

A.—*With an erectile spine near the orbit.*

Genus, 1—Botia, *Gray*.

Hymenophysa and *Schistura*, McClelland: *Diacanthus*, Swainson: *Syncrossus*, Blyth.

Body oblong, compressed, with the dorsal profile more or less elevated. Eye with a free circular eyelid. Barbels six to eight: four on the snout united at their bases, two on the upper jaw, if eight the extra ones are on the mandibles. A bifid, erectile, suborbital spine present. Dorsal fin commences anterior to the root of the ventral; caudal forked. No scales on the head. Air-bladder in two divisions, the anterior being partially enclosed in a bony capsule, whilst the posterior portion is free in the abdominal cavity.

Hamilton Buchanan observes of the Loaches, "those which are striped are more beautiful fishes (than those with cloud-like marks) resembling the appearance of the others but slightly, and differing a good deal in habits, especially in swimming higher and in not remaining so stationary at the bottom," p. 349.

Geographical distribution.—Found throughout the Valley of the Ganges, the Sind hills, the Himalayas, Assam, Burma to the Malay Archipelago.

SYNOPSIS OF SPECIES.

1. *Botia nebulosa.* D. 15, A. 7. Barbels six. Darjeeling.
2. *Botia dario.* D. 12-13, A. 7-8. Barbels eight. Bengal, N. W. Provinces, Assam and Cachar.
3. *Botia geto.* D. 13, A. 7. Barbels eight. Sind, Punjab, Himalayas, Valley of Ganges and Assam.
4. *Botia Almorhæ.* D. 11-12, A. 7-8. Barbels eight. Himalayas and Khasia hills.
5. *Botia Berdmorei.* D. 13-15, A. 7. Barbels eight. Burma and Tenasserim.
6. *Botia histrionica.* D. 10, A. 7. Barbels eight. Pegu.

1. Botia nebulosa.

Blyth, Proc. A. S. of Beng. 1860, p. 165; Day, Proc. Zool. Soc. 1869, p. 550.

B. iii, D. 15($\frac{3}{12}$), P. 13, V. 8, A. 7($\frac{2}{5}$), C. 17.

Length of head 5, of caudal 5, height of body 5 in the total length. *Eyes*—in the middle of the length of head: 2 diameters from end of snout and also apart. Profile of back slightly elevated. A bifid erectile spine below the orbit.* *Barbels*—two rostral pairs extending as far as to the anterior margin of the orbit, whilst the maxillary ones are slightly longer. *Fins*—dorsal commences midway between the base of the caudal and the snout, and opposite the end of the pectoral. Ventral commences under the sixth dorsal ray. Caudal lobes slightly rounded. *Scales*—small, 13 rows between the lateral line and the base of the ventral fin. *Colours*—brownish, with a leaden band along the side. Dorsal and caudal barred in spots. An ocellus at the upper margin of the base of the caudal fin.

Habitat.—Darjeeling, from whence Dr. Wallich sent an example, $4\frac{1}{2}$ inches long, to the Calcutta Museum.

2. Botia dario, Plate CLIV, fig. 1.

Cobitis dario, Ham. Buch. Fish. Ganges, pp. 354, 394, pl. 29, f. 95; Cuv. and Val. xviii, p. 85; Bleeker, Beng. pp. 70, 143.

Schistura dario, McClell. Ind. Cyp. pp. 306, 444, pl. 61, f. 8.

Diacantha flavicauda, Swainson, Fishes, ii, p. 310.

Botia dario, Günther, Catal. vii, p. 366.

Sahinga, Punj.; *Bucktea*, Hind.

B. iii, D. 12-13($\frac{3}{9-10}$), P. 14, V. 8, A. 7-8($\frac{2}{5-6}$), C. 19.

Length of head $4\frac{1}{2}$ to 5, of caudal 5, height of body $4\frac{1}{2}$ to 5 in the total length. *Eyes*—in about the middle of the length of the head, 5 diameters in the length of the head, 2 to $2\frac{1}{2}$ diameters from the end of snout, and 2 apart. Snout rather obtuse. Suborbital spine reaches to below the hind edge of the eye. *Barbels*—eight. Posterior portion of air-vessel free in the abdominal cavity. *Fins*—dorsal commences midway between the end of the snout and the base of the caudal fin. *Scales*—very indistinct. *Colours*—seven or eight oblique bands descend from the back to the abdomen, and two or three, or even more, cross either lobe of the caudal fin.

Habitat.—Bengal, N. W. Provinces, Assam, and Cachar.

3. Botia geto, Plate CLIV, fig. 2.

Cobitis geto, Ham. Buch. Fish. Ganges, pp. 355, 394, pl. xi, f. 96; Cuv. and Val. xvii, p. 84.; Bleeker, Beng. p. 70.

Schistura geto, McClelland, Ind. Cyp. pp. 306, 444, pl. 61, f. 9.

Diacantha zebra, Swainson, Fishes, ii, p. 310.

Botia rostrata, Günther, Catal. vii, p. 367.

Shee-nharo, Sind.

* The suborbital spine was damaged in the unique example.

B. iii, D. 12($\frac{3}{9}$), P. 14, V. 8, A. 7($\frac{2}{5}$), C. 19.

Length of head $5\frac{1}{4}$, of caudal 5, height of body 5 to $5\frac{1}{4}$ in the total length. *Eyes*—generally slightly behind the middle of the length of the head, diameter 7 in the length of head, 4 diameters from end of snout. Interorbital space not quite equal to 2 diameters of the orbit. Body and head compressed. Snout pointed, usually longer than the remaining portion of the head. Suborbital spine as a rule not extending to below the posterior margin of the orbit. *Barbels*—eight. Depth of free portion of tail $1\frac{1}{4}$ in its length. *Fins*—dorsal arises midway between the anterior margin of the orbit and the base of the caudal, which last has sharp lobes. *Scales*—minute, but more distinct than in *B. dario*. *Colours*—body, in the adult, with irregular and partly confluent brown cross bands, which enclose variously sized round yellowish or bluish spots. Dorsal and anal fins with two: pectoral, ventral, and each lobe of the caudal, with three black cross bands. In the *young* the bands on the body form arches, four or five in number, passing over a dark vertical band or mark. The proportion of the body and size of the suborbital spine rather vary with age.

Habitat.—From Sind, through the Punjab, Himalayas, Valley of the Ganges, Jumna, Sone river, and Assam. The specimen figured was from a stream in the Sind hills.

4. Botia Almorhæ, Plate CLIV, fig. 5.

Gray, Zool. Misc. 1831, p. 8; Günther, Catal. vii, p. 367.
Botia grandis, Gray and Hardw. Ind. Zool.; Cuv. and Val. xviii, p. 86.
Schistura grandis McClell. Cal. J. N. H. ii, p. 586.
Cobitis grandis, Bleeker, Beng. p. 70.

B. iii, D. 11-12($\frac{2}{9-10}$), P. 14, V. 8, A. 7-8($\frac{2}{5-6}$), C. 19.

Length of head $4\frac{1}{2}$, of caudal 5, height of body 5 to $5\frac{1}{2}$ in the total length. *Eyes*—rather behind the middle of the length of the head, 3 diameters from end of snout, and 2 apart. Body, head, and snout compressed. Suborbital spine strong, extending to below the hind edge of the orbit. *Barbels*—eight. *Fins*—dorsal commences midway between the posterior nostrils and the base of the caudal fin in the adult: but between the latter and front end of the snout in the immature. *Scales*—present. *Colours*—body reticulated with gray on a yellow ground: fins yellow: the dorsal, pectoral, and anal, with four transverse dark bands, the pectoral and each caudal lobe with five. Sometimes examples are vertically banded, each band being reticulated.

Habitat.—Cashmere, Almorah and Khasia hills. It attains at least, 6 inches in length. The specimen figured was procured for me at Almorah by Dr. Govan.

5. Botia Berdmorei, Plate CLIV, fig. 3.

Syncrossus Berdmorei, Blyth, J. A. S. of Bengal, 1860, p. 166.
Botia Berdmorei, Day, Proc. Zool. Soc. 1869, p. 549.
Nga-tha-lay-doh and *Shoay-zagay*, Burmese.

B. iii, 13-15($\frac{2}{11-13}$), P. 13, V. 8, A. 7($\frac{2}{5}$), C. 17.

Length of head $4\frac{2}{3}$ to 5, of caudal 5, height of body 5 to $5\frac{1}{2}$ in the total length. *Eyes*—in about the middle of the length of the head, diameter 6 to 7 in the length of head, 4 diameters from end of snout and $1\frac{1}{2}$ apart. Body compressed. Suborbital spine reaches to below the middle of the eye. *Barbels*—six. *Fins*—dorsal commences midway between the posterior nostril or the orbit and the base of the caudal fin. *Scales*—minute. *Colours*—buff, with 10 or 11 vertical darkish bands, extending from the back to the abdomen. Head likewise banded, and a dark line from the eye to the snout. Numerous oblong blotches over the body, sometimes commencing opposite the orbit and ceasing about the end of the pectoral fin, in other examples being continued all over the body. Dorsal fin with three or four rows of spots, and sometimes a large one at the base of the last three or four rays: caudal with five or six: anal with two.

This species appears closely allied to *B. hymenophysa*, Bleeker, but differs in its dorsal fin, and also in its colours, &c.

Habitat.—The Irrawaddy river in Burma, and waters in its vicinity, certainly as high as Mandalay: also Tenasserim. The example figured (life-size) was from Mandalay.

6. Botia histrionica, Plate CLIV, fig. 4.

Blyth, J. A. S. of Bengal, 1860, p. 166; Day, Proc. Zool. Soc. 1869, p. 550.

B. iii, D. 10($\frac{2}{8}$), P. 15, V. 8, A. 7($\frac{2}{5}$), C. 19.

Length of head 5, of caudal 5, height of body $4\frac{2}{3}$ in the total length. *Eyes*—small, diameter 1/6 of length of head, $2\frac{1}{2}$ diameters from end of snout, 2 diameters apart. Suborbital spine very strong and extending to opposite the posterior margin of the orbit. *Barbels*—eight. *Fins*—dorsal arises nearer the base of the caudal than the end of the snout: it is slightly in advance of the ventrals. Caudal deeply forked. *Scales*—inconspicuous. *Colours*—olive, with five dark vertical bands on the body, and two on the head. All the fins with two broad brown bars.

Habitat.—Burma. The single example (figured) came from Pegu, and is in the Calcutta Museum.

Genus, 2—ACANTHOPSIS, *v. Hasselt.*

Prostheacanthus, Blyth.

Body very elongated, snout long and compressed. Barbels eight, two being mandibular. A small, bifid, erectile spine, situated in advance of the orbit. Dorsal fin opposite to the ventrals; caudal forked.

Geographical distribution.—Burma to the Malay Archipelago.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Acanthopsis choirorrhynchus.* D. 11, A. 8. Burma, &c.

1. Acanthopsis choirorrhynchus, Plate CLV, fig. 1.

Cobitis choirorrhynchus, Bleeker, Nat. Tyds. Ned. Ind. vii, p. 95.

Prostheacanthus spectabilis, Blyth, Proc. A. S. of B. 1860, p. 167.

Acanthopsis choirorrhynchus, Bleeker, Atl. Ich. Cyp. p. 9, t. i, f. 3; Günther, Catal. vii, p. 365; Day, Proc. Zool. Soc. 1869, p. 549.

Nga-tha-lay-doh, Burmese.

B. iii, D. 11($\frac{2}{9}$), P. 11, V. 7, A. 8($\frac{3}{5}$), C. 11.

Length of head 5, of caudal 6, height of body 9 in the total length. *Eyes*—diameter 1/6 of the length of head, 4 diameters from the end of snout, 1/2 a diameter apart. Body elongated and compressed, a rise from the snout to the occiput. Snout produced: nostrils nearer the end of the snout than to the anterior margin of the orbit. An erectile bifid spine situated between the nostrils and the orbit, and on a level with its lower margin. *Barbels*—eight, all short. *Fins*—dorsal commences midway between the snout and the base of the caudal fin, it is slightly in advance of the ventral. Caudal lobed, the lower slightly the longer. *Scales*—minute. *Lateral-line*—complete. *Colours*—brownish, with 12 bands across the back, and the same number of blotches along the lateral-line: two rows of blotches along the dorsal, and three across the anal fins.

Habitat.—Burma, and the eastern portion of Sumatra.

Genus, 3—SOMILEPTES (Swainson) *Bleeker.*

Body elongated and compressed, dorsal profile nearly horizontal: snout elongated. Eyes prominent. Six barbels—four on the snout, and two on the upper jaw. A small erectile, bifid, suborbital spine. Dorsal fin inserted slightly behind the ventral: caudal entire.

Geographical distribution.—From Orissa through Bengal to Assam.

SYNOPSIS OF SPECIES.

1. *Somileptes gongota*, D. 10, A. 8. Barbels short. Assam.

1. Somileptes gongota, Plate CLV, fig. 2.

Cobitis gongota, Ham. Buch. Fish. Gang. pp. 351, 394; Bleeker, Beng. p. 70; Günther, Catal. vii, p. 363.

Cobitis cucura, Ham. Buch pp. 352, 394; McClelland, Ind. Cyp. pp. 303, 434, t. 51, f. 2 (from H. B.'s MSS.), young; Cuv. and Val. xviii, p. 70; Bleeker, Beng. p. 73.

Cobitis oculata, McClelland, Ind. Cyp. pp. 303, 433, t. 51, f. 1, (from H. B.'s MSS.) adult.

? *Cobitis amnicola*, Cuv. and Val. xviii, p. 68; Bleeker, Beng. p. 70.

Canthophrys albescens, Swainson, Fishes, ii, p. 310.

Somileptes bispinosa, Swainson, Fishes, ii, p. 311; Bleeker, Atl. Ich. Cyp. p. 3.

Reetah, Assam.

B. iii, D. 10($\frac{2}{8}$), P. 10, V. 7, A. 7($\frac{2}{5}$), C. 16.

Length of head $5\frac{1}{4}$, of caudal $6\frac{1}{4}$, height of body 7 in the total length. *Eyes*—high up, situated rather behind the middle of the length of the head. Snout with its upper edge rather concave, it and the rest of the head covered with fine warty excrescences. Suborbital spine bifid, and reaching to below the first half of the eye. *Barbels*—rather short, extending nearly half way to below the eyes. *Fins*—origin of dorsal opposite the root of the inner ventral ray, and midway between the hind edge of the eye and the base of the caudal fin: caudal entire. *Scales*—small, 17 rows between lateral-line and base of ventral fin. *Colours*—an undulated band along the side of the body, giving off vertical bars towards the back, or else oblique blotches with light edges descending from the back or placed irregularly on the body. Dorsal and caudal fins with transverse rows of blackish dots.

Habitat.—Assam, Bheer Bhoom, and Khasia hills. The example figured (life-size) was from the Khasia hills.

Genus, 4—Lepidocephalichthys, *Bleeker.*

Platacanthus, Day ; *Misgurnus*, sp. Günther.

Body elongated and moderately compressed, back not elevated. Six or eight barbels, four of which belong to the mandibles. A large, erectile, bifid, suborbital spine. The sub- and post-orbital regions, and also the upper part of the opercle scaled. Dorsal fin short, commencing opposite, or nearly so, to the ventral ; the internal ray of the pectoral fin may be modified into a flat osseous spine ; caudal truncate or slightly emarginate.

As regards the barbels in this genus, it must be remarked that on either side of the mandible is a skinny flap, ending internally in a barbel, and externally being connected to the maxillary barbel. Along the outer edge of this flap, short barbels to the number of two or three, are generally developed.

This genus is separated from *Cobitis* not only by the mandibular flap being provided with barbels, but also due to the existence of scales on the head, in the sub- and post-opercular regions. The pectoral ray modified into a spine which exists in this genus, and also in *Jerdonia*, and in the European *Cobitis tænia*, is employed for digging into the sand, in which way they rapidly bury themselves on the approach of danger as I have frequently observed in an aquarium.

Geographical distribution.—India, Burma, Ceylon, and the Malay Archipelago.

SYNOPSIS OF SPECIES.

1. *Lepidocephalichthys guntea*, D. 8, A. 7, L. l. 115. Length of head $6\frac{1}{2}$ to $6\frac{3}{4}$ in the total. 25 to 30 rows of scales between the base of the anal fin and the back. India, except the Malabar coast and south of the Kistna.

2. *Lepidocephalichthys thermalis.* D. 8, A. 7. Length of head $5\frac{1}{2}$ in the total. 30 to 40 rows of scales between base of anal fin and the back. Southern India, Malabar, and Ceylon.

3. *Lepidocephalichthys Berdmorei.* D. 8, A. 7-8. Length of head 6 to $6\frac{1}{4}$ in the total. About 40 rows of scales between base of anal fin and the back. Burma.

1. Lepidocephalichthys guntea, Plate CLV, fig. 4.

Cobitis guntea, Ham. Buch. Fish. Ganges, pp. 353, 394; McClelland, Ind. Cyp. pp. 303, 434, t. 51, f. 3 (from H.B.'s MSS.) ; Cuv. and Val. xviii, p. 67 ; Bleeker, Beng. p. 70 ; Günther, Catal. vii, p. 363 ; Day, Proc. Zool. Soc. 1869, p. 383.

? *Cobitis phoxocheila*, McClelland, Ind. Cyp. pp. 305, 439, t. 52. f. 4 *(young)* ; Cuv. and Val. xvii, p. 79 ; Bleeker, Beng. p. 70.

Cobitis maya, Sykes, Trans. Zool. Soc. ii, p. 367.

Canthophrys vittatus, Swainson, Fishes, ii, p. 310.

Misgurnus lateralis, Günther, Catal. vii, p. 346.

Kondaturi and *Gupkari*, Ooriah.

B. iii, D. 8-9($\frac{2}{6-7}$), P. 8, V. 7-8, A. 7($\frac{2}{5}$), C. 16, L. l. ca. 115.

Length of head $6\frac{1}{2}$ to $6\frac{3}{4}$, of caudal 6, height of body $5\frac{3}{4}$ to $6\frac{1}{2}$ in the total length. *Eyes*—situated rather before the middle of the length of the head, diameter 1/5 of length of head, $1\frac{1}{2}$ diameters from end of snout, and one diameter apart. Body compressed. *Barbels*—two rostral and a maxillary pair, all longer than the orbit : a fleshy flap from the lower surfaee of the mandibles on either side joins the maxillary barbel, and each has one or two barbels along its edge. *Fins*—dorsal arises midway between the orbit and the base of the caudal fin : caudal generally entire, its centre rays however, may be somewhat shortened or even lengthened. Inner pectoral ray sometimes modified into a flat spine having a branched termination. *Scales*—distinct, and covering not only the suborbital ring of bones on the head but also going in a band from the eye to above the opercles : 25 to 30 rows between the base of the anal fin and the back. *Lateral-line*—absent. *Colours*—generally dirty yellowish, with a light band extending from the centre of the snout, and ending in a black ocellus above the middle of the base of the caudal fin ; below this band are a series of dark blotches festooned inferiorly, whilst the back is similarly marked. Dorsal and caudal with numerous rows of dark spots, but only about 4 on the caudal in Deccan examples, and often two rows on the anal fin.

Variety, *L. balgara*, Plate CLVI, fig. 12.

Cobitis balgara, Ham. Buch. Fish. Gang. pp. 356, 394 ; Cuv. and Val. xviii, p. 74.

Schistura balgara and *aculeata*, McClell. Ind. Cyp. p. 307, pl. 53, f. 2 (from H.B.'s MSS.) ; Cuv. and Val. xviii, p. 70 ; Bleeker, Beng. p. 70.

Canthophrys olivaceus, Swainson, Fishes, ii, p. 310.

Lepidocephalichthys balgara, Günther, Catal. vii, p. 365 ; Day, P. Z. S. 1870, p. 70.

Jubbi cowri, Ooriah.

This closely resembles the above but has its body a little more elongated, and its caudal fin is sometimes cut rather more square : in a few examples the ventral fin is slightly in advance of the dorsal but not so in others.

Occasionally, examples after having been kept some time in spirit, show a brownish back separated from a

wide brown, black, or green central band, by a light line, otherwise coloured as described above (*Misgurnus lateralis*, Günther).*

Habitat.—Punjab, throughout India (except Mysore and south of the Kistna, and also the Malabar coast.) I have them from Darjeeling, and several localities on the Himalayas.

2. Lepidocephalichthys thermalis, Plate CLV, fig. 3.

Cobitis thermalis, Cuv. and Val. xviii, p. 78; Bleeker, Beng. p. 70.

Lepidocephalichthys thermalis, Bleeker, in Verh. Holl. Maat. Haar. 1864, Cyprin. and Cobit. Ceylon, p. 6, t. i, f. 1; Günther, Catal. vii, p. 364; Day, Proc. Zool. Soc. 1869, p. 383.

Cobitis Carnaticus, *Mysorensis*, and *? rubripinnis*, Jerdon, M. J. L. and S. 1849, pp. 331, 332, 333.

Platacanthus agrensis, Day, Fishes of Malabar, p. 204, pl. 14, f. 1.

Assaree, Tam.: *Jubbi cowri*, Ooriah: *Bálu*, Hind.

B. iii, D. $8(\frac{2}{6})$, P. 7, V. 7, A. $7(\frac{2}{5})$, C. 16.

Length of head $5\frac{1}{2}$, of caudal 6, height of body $5\frac{1}{2}$ in the total length. *Eyes*—almost entirely in the anterior 1/2 of the head. Suborbital spine, strong. *Barbels*—eight, the longest extending to below the anterior margin of the orbit. *Fins*—origin of dorsal slightly in advance of the ventral, and nearer the root of the caudal than the snout. Caudal slightly emarginate. The inner pectoral ray is modified in some adult males into a flat osseous spine which is used for diving down into the mud. *Scales*—distinct, about 30 rows between the base of the anal fin and the back. *Colours*—sandy, with irregular blotches on the lateral-line, and others along the back; a black spot generally exists at the base of the upper half of the caudal fin. Dorsal fin with black spots or bars, caudal with four bands. A dark streak often extends from the eye to the end of the snout. I found 2,500 eggs in a female example.

Habitat.—Southern India, the Malabar coast, the Wynaad, and Ceylon.

3. Lepidocephalichthys Berdmorei, Plate CLIII, fig. 3.

Acanthopsis Berdmorei, Blyth, Proc. Asi. Soc. of Bengal, 1860, p. 168.

Acanthopsis micropogon, Blyth, l. c.

Cobitis Berdmorei, Day, Proc. Zool. Soc. 1869, p. 550.

Nga-tha-lay-doh, Burmese.

B. iii, D. $8(\frac{2}{6})$, P. 10, V. 8, A. $7\text{-}8(\frac{2}{5\text{-}6})$, C. 17.

Length of head 6 to $6\frac{1}{4}$, of caudal 6 to $6\frac{1}{4}$, height of body $5\frac{1}{2}$ to 6 in the total length. *Eyes*—situated just before the middle of the length of head, 2 diameters from the end of the snout. Suborbital spine bifid, and extending to beneath the first third of the orbit. *Barbels*—two pairs of rostral and a maxillary pair extending to below the hind edge of the orbit: the mandibular flap with two or three pairs of short ones. *Fins*—dorsal 2/3 as high as the body below it, commencing slightly posterior to the ventral and midway between the hind edge of the eye or even of the head and the base of the caudal fin, the latter of which is slightly emarginate. Pectoral does not reach quite half way to the ventral *Scales*—small, about 40 rows between the anal fin and the back; several rows (about 12) along the suborbital ring of bones. *Colours*—of a rich yellowish-brown, with a dark line along the body composed of spots, upper surface of body covered with fine markings: a black spot at the base of the caudal fin. Dorsal and caudal fins lineated with fine spots: some also on the outer portions of pectoral, ventral, and anal.

Habitat.—Moulmein in Burma, where it is common.

Genus, 5.—ACANTHOPHTHALMUS, *v. Hasselt.*

Pangio, Blyth.

Body elongated and strongly compressed. An erectile, bifid, suborbital spine. Six barbels, one rostral and two maxillary pairs. Dorsal fin situated in the posterior third of the body, anterior to the anal, but posterior to the ventrals.

Geographical distribution.—North-east Bengal, Assam and Burma.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Acanthophthalmus pangia.* D. 8, A. 7. Cinnamon colour. N.E. Bengal to Upper Burma.

1. Acanthophthalmus pangia, Plate CLV, fig. 5.

Cobitis pangia, Ham. Buch, Fish. Ganges, pp. 355, 394; Cuv. and Val. xviii, p. 75; Bleeker, Beng. p. 70.

Cobitis cinnamomea, McClell. Ind. Cyp. pp. 304, 435, pl. 51, f. 5. (from H. B.'s MSS.).

Canthophrys rubiginosus, Swainson, Fishes, ii, p. 310.

Pangio cinnamomea, Blyth, Proc. A. S. of B. 1860, p. 169.

* Dr. Günther's three examples of *Misgurnus lateralis* in the British Museum, have all well-developed suborbital spines, whereas in his definition of genus *Misgurnus*, he correctly observes, "no suborbital spine." What he terms "the outer longer pair" "of mandibular barbels" are identical with what are considered "maxillary barbels," in his genus *Lepidocephalichthys*.

? *Acanthophthalmus Javanicus*, Bleeker, Cyp. Proc. p. 75, and Atl. Ich. Cypr. p. 11, t. 2, f. 3.
Acanthophthalmus pangia, Günther, Catal. vii, p. 370.
Pangya, Beng.: *Nga-tha-lay-doh*, Burmese.

B. iii, D. 8($\frac{2}{6}$), P. 10, V. 6-7, A. 7($\frac{2}{5}$), C. 17.

Length of head $7\frac{1}{2}$ to 8, of caudal 8, height of body $7\frac{1}{2}$ to 8 in the total length. *Eyes*—minute. *Barbels*—six, the longest about 2/5 of the length of the head. *Fins*—the dorsal arises in commencement of the posterior third of the distance between the eye and the base of the caudal fin, and midway above the interspace between the ventral and the anal. Caudal entire. *Scales*—distinct. *Colour*—light cinnamon.

Habitat.—North-east Bengal, the northern portions of the British and Upper Burma. I have received an example from below Darjeeling, collected by Mr. Mandelli: it agrees with the others, except in having no scales, but as it is not in a good state, I conclude they may have been rubbed off.

Genus, 6—Apua, *Blyth.*

Body elongated and compressed. A small, erectile, bifid, suborbital spine. Eight barbels, one rostral pair, one maxillary pair, and two mandibular pairs. Dorsal fin in the posterior third of the body, but anterior to the anal. Ventral fins absent.

Geographical distribution.—The single species of this genus, which has yet been discovered, was obtained near Pegu in British Burma.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Apua fusca*, D. 8, A. 8. Burma.

1. Apua fusca, Plate CLV, fig. 6.

Blyth, Journal Asiatic Society of Bengal, 1860, p. 169; Günther, Catal. vii, p. 371; Day, Proc. Zool. Soc. 1869, p. 349.

B. iii, D. 8($\frac{2}{6}$), P. 11, A. 8($\frac{2}{6}$), C. 16.

Length of head $7\frac{1}{2}$ to 8, of caudal 9, height of body $7\frac{1}{2}$ to 8 in the total length. *Eyes*—small, diameter 9 in length of head, 4 diameters from end of snout: a barbel-like flap between the nostrils. A small erectile bifid spine below the orbit. *Barbels*—six, the longest 1/3 the length of the head. *Fins*—dorsal arises in the commencement of the last 1/3 or 1/4 of the distance between the eye and the base of the caudal fin, and is half as high as the body: caudal rounded. *Scales*—minute. *Colours*—brownish, with a longitudinal darker band.

Habitat.—Pegu in Burma. It attains at least $2\frac{1}{2}$ inches in length.

Genus, 7—Jerdonia, *Day.*

Platacanthus, sp. Day.

Body elongated, and moderately compressed. Eight barbels, two of which are mandibular. A free, erectile, bifid, suborbital spine. Dorsal fin long (twenty-seven branched rays), commencing before the ventrals; the internal ray of the pectoral fin modified into a flat osseous spine; caudal slightly emarginate.

Geographical distribution.—Madras Presidency.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Jerdonia maculata*, D. 30, A. 9. Madras.

1. Jerdonia maculata, Plate CXLIV, fig. 6.

Platacanthus maculatus, Day, Proc. Zool. Soc. 1867, p 941, and 1870, p. 700.

B. iii, D. 30($\frac{3}{27}$), P. 5/1, V. 8, A. 9($\frac{3}{6}$), C. 21.

Length of head 2/11, of caudal 1/5, height of body 1/6 of the total length. *Eyes*—diameter 1/6 of length of head, two diameters from end of snout. Dorsal profile slightly ascends to the commencement of the dorsal fin. Suborbital spine reaches to beneath the anterior third of the orbit. *Scales*—small, but distinct. *Colours*—grayish, becoming dirty white along the abdomen. A dark lateral band extends from the eye to the tail: along its first half are three black spots, whilst the whole extent of the back is irregularly lineated. *Fins*—yellow. Dorsal with four black bands. Caudal with three bands and a dark margin. A black mark at the base of the tail, with a smaller one above and another below it.

Habitat.—Madras.

B.—*Without an erectile spine near the orbit.*

Genus, 8—Nemachilichthys.

Body elongated. Dorsal profile not elevated. Snout rather compressed and elongated. Eyes rather

prominent. Barbels six, two rostral and one maxillary pair. No spine on the head. Dorsal fin of moderate length, commencing somewhat in advance of the ventrals. Caudal forked.

The appearance is very similar to *Acanthopsis*, but there is no spine on the head.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Nemachilichthys Ruppelli*, D. 13, A. 7. Greenish yellow, with brown bands: fins yellow, with black bands or rows of spots. Deccan.

Nemachilichthys Ruppelli, Plate CLV, fig. 7.

Cobitis Ruppelli Sykes, Trans. Zool. Soc. ii, p. 366, pl. 64, fig. 1; Bleeker, Beng. p. 70.
Nemacheilus Ruppelli, Day, J. A. S. Beng. 1872, p. 184.

B. iii, D. 13($\frac{2}{11}$), P. 13, V. 8, A. 7($\frac{2}{5}$), C. 19.

Length of head $5\frac{1}{4}$, of caudal 5, height of body $7\frac{1}{2}$ in the total length. *Eyes*—slightly behind the middle of the length of the head, $2\frac{1}{4}$ diameters from end of snout. Head pointed. *Barbels*—four well developed rostral ones joined at their bases, and nearly 1/2 as long as the head, also a maxillary pair. *Fins*—dorsal arises midway between the snout and base of the caudal which is forked: the upper margin of the dorsal fin straight. *Scales*—moderately developed. *Lateral-line*—distinct. *Colours*—greenish yellow except the abdomen which is white, short brown bars along the lateral-line, and the rays of the dorsal and anal barred. Caudal with four posteriorly directed V-shaped brown bars. A black spot at the base of the upper caudal lobe.

The elongated snout of this species is very similar to that seen in *Acanthopsis*, but it has no spine on the head: its rostral barbels arise on one base as seen in *Botia*.

Habitat.—Deccan. The example figured (life size) was from Poona.

Genus, 9—NEMACHEILUS, *van Hasselt.*

Acoura and *Acourus*, Swains.: *Acanthocobitis*, Peters: *Oreias*, Sauvage: *Diplophysa*, Kessler.*

Body elongated. Dorsal profile nearly horizontal. Barbels eight or six, when the former number is present, the extra pair belongs to the posterior nostrils; none on the mandibles. No spine on the head. Dorsal fin of moderate length, or short, situated opposite the ventrals.

This genus has been subdivided into those species which have upwards of twelve dorsal rays *(Acanthocobitis)*, and those with less than twelve. As this arbitrary division is not a natural one, it is not adopted here. Another subdivision has been instituted into those in which the tail is forked, and those in which it is entire. The genus, may, however, be subdivided into those with eight and those with six barbels.

Amongst these little fishes there are several subjects that have to be mentioned, which though of consequence in some carps appear to be of less value in the loaches. The height of the body is liable to vary considerably in accordance with whether it is well or ill nourished. The number of rays in the dorsal fin in some *(N. botia)* appear to be subject to variation. Sometimes the preorbital is raised and with a free lower edge, while this may not occur in all examples of the same species: and the form of the caudal fin likewise is occasionally inconstant, being slightly convex, concave, or cut square in fishes of the same species.

Some species are strongly compressed posteriorly, and in those from hilly regions we sometimes see folds of skin more or less covering the eye like a lid.

Geographical distribution.—Fresh waters of India, Ceylon, and Burma.

SYNOPSIS OF SPECIES.

a. With eight barbels.

1. *Nemacheilus Evezardi*, D. 9. Greenish, with small dark blotches. Poona in the Deccan.

b. With six barbels.

2. *Nemacheilus pavonaceus*, D. 16-20. Body barred; caudal slightly notched.
3. *Nemacheilus rubidipinnis*, D. 15-16. Body with 12 to 15 bands. Caudal emarginate. Tenasserim.
4. *Nemacheilus botia*, D. 11-14. Body irregularly blotched. Caudal entire or slightly emarginate. Throughout India and Ceylon, except Malabar.
5. *Nemacheilus monoceros*, D. 12. Caudal and dorsal fins barred. Caudal rounded. Assam.
6. *Nemacheilus pulchellus*, D. 12. Caudal forked. Yellow blotches on body. Fins barred. Bowany river.
7. *Nemacheilus sinuatus*, D. 10-11. Caudal cut square. Vertical brown bands, with shorter intermediate ones. Dorsal and caudal barred. Wynaad.

* This includes species from Western Turkestan, having the air-vessel in two parts, the anterior enclosed in a bony capsule, the posterior free and elongated in the abdominal cavity.

8. *Nemacheilus Guentheri*, D. 10-11. Reticulated with brown. Caudal forked. Neilgherries.

9. *Nemacheilus semiarmatus*, D. 10-11. Irregular spots and bars on the body and fins. Caudal forked. Neilgherries.

10. *Nemacheilus corica*, D. 10. About 13 blotches along the side. Caudal forked. N.E. Bengal, Punjab, Assam.

11. *Nemacheilus rupicola*, D. 9-11. Eleven to 17 brown bands on the body, as wide or wider than the ground colour. Dorsal and caudal banded or spotted. Caudal forked. Himalayas.

12. *Nemacheilus montanus*, D. 9-10. Eleven to 12 vertical bands. Caudal emarginate. Himalayas.

13. *Nemacheilus striatus*, D. 11-12. Sixteen to 20 vertical bands, wider than the ground colour. Caudal emarginate. Wynaad.

14. *Nemacheilus multifasciatus*, D. 10. Snout compressed, eye small; numerous vertical bands, widest in last 1/2 of body. Caudal lobed. Darjeeling and Assam.

15. *Nemacheilus Denisonii*, D. 10. Mouth of moderate width. Nine to 12 vertical bands wider than the ground colour. Caudal lobed. Southern India and the Deccan.

16. *Nemacheilus notostigma*, D. 10. Snout compressed: eye of moderate size. Ten to 14 vertical bands wider than the ground colour. Caudal lobed. Ceylon.

17. *Nemacheilus zonalternans*, D. 11. Ten to 11 vertical bands, with intermediate ones superiorly. Dorsal and caudal spotted. Caudal entire. Tenasserim provinces.

18. *Nemacheilus Ladacensis*, D. 10. Sixteen to 18 interrupted and sinuous bands. Caudal lobed or emarginate. Tibet.

19. *Nemacheilus zonata*, D. 9. Eleven to 15 dark zones encircle the body, which are not half the width of the ground colour. Caudal forked. Assam, Jumna and Ganges rivers, and Orissa.

20. *Nemacheilus cincticauda*, D. 10. Ten brown zones encircle the body, usually wider than the ground colour. Caudal slightly forked. Upper Assam and Burma.

21. *Nemacheilus triangularis*, D. 10. Seven black-edged angular bands on the body. Caudal emarginate. Travancore.

22. *Nemacheilus savona*, D. 10-11. Ten to 12 very narrow white bands. Caudal slightly emarginate. Bengal and N.W. Provinces.

23. *Nemacheilus Beavani*, D. 10. Dark bands, wider than the interspaces. Caudal forked. Cossie river and Bowany.

24. *Nemacheilus spilopterus*, D. 9-10. Eleven to 15 irregular bands. Caudal slightly emarginate. Himalayas, Assam and Cochin China.

25. *Nemacheilus marmoratus*, D, 9. Mottled with brown. Caudal entire. Cashmere.

26. *Nemacheilus Stoliczkæ*, D. 9. Marbled with brownish black. Caudal emarginate. Head waters of Indus, also Tibet.

27. *Nemacheilus Blythii*, D. 9. Brownish. Caudal forked. India?

28. *Nemacheilus Butanensis*, D. 9. Caudal rounded. Boutan.

29. *Nemacheilus gracilis*, D. 9. Brownish. Caudal emarginate. Head waters of Indus.

30. *Nemacheilus turio*, D. 8, (10 ?) Spotted and blotched. Caudal emarginate. Assam.

31. *Nemacheilus guttatus*, D. 8. Dark blotches. Caudal entire. Upper Assam.

a. With eight barbels.

1. Nemacheilus Evezardi, Plate CLIII, fig. 11.

B. iii, 9($\frac{2}{7}$), P. 12, V. 8, A. 7($\frac{2}{5}$), C. 17.

Length of head $5\frac{1}{3}$, of caudal 5, height of body 6 in the total length. *Eyes*—just before the middle of the length of the head and rather minute, about 3 diameters from the end of the snout and the same apart. Head broad, its width equalling its length without the snout, which is rounded. No spine on the head. *Barbels*—well developed, one pair of nasal, reaching to opposite hind edge of the eye: two pair of rostral, and one maxillary pair. *Fins*—dorsal commences opposite to the ventrals and midway between the anterior margin of the orbit and the base of the caudal; upper edge of dorsal fin slightly convex; pectoral longer than the head, and reaching three quarters of the distance to the base of the ventral. Caudal rounded. *Scales*—very minute. *Lateral-line*—indistinct. *Colours*—greenish, with small dark blotches having a vertical direction, a dark spot at the base of the caudal fin, which has four V-shaped bands: some spots on dorsal fin: outer half of pectoral dark.

Habitat.—Poona. A single specimen received amongst a collection which Colonel Evezard assisted in procuring. The example is figured life size.

b. With six barbels.

2. Nemacheilus pavonaceus, Plate CLIII, fig. 12.

Cobitis pavonacea, McClelland, Ind. Cyp. pp. 305, 437, pl. 52, fig. 1; Cuv. and Val. xviii, p. 37; Bleeker, Beng. p. 70.

Nemacheilus pavonaceus, Günther, Catal. vii, p. 348.
Acanthocobitis longipinnis, Peters, Mon. Ak. Wiss. Berl. 1861, p. 712.

B. iii, D. 16-20($\frac{2}{14}$-$\frac{3}{18}$), V. 8, A. 7($\frac{2}{5}$), C. 19.

Length of head $5\frac{3}{4}$, of caudal $7\frac{1}{2}$, height of body 6, of dorsal fin $5\frac{1}{2}$ in the total length. *Eyes*—in the middle of the length of the head, diameter 2/9 of length of head, 2 diameters from end of snout. In some specimens the pre-orbital forms a blunt spine. *Fins*—dorsal situated rather in front of the middle of the total length, it commences nearer to the snout than to the base of the caudal, which latter is slightly emarginate. *Scales*—absent. *Colours*—body crossed by about twenty half bars of a darkish gray: a dark ocellus surrounded by a light margin exists upon the upper portion of the base of the caudal fin. Dorsal and caudal barred.

Habitat.—Assam.

3. Nemacheilus rubidipinnis, Plate CLIII, fig. 4.

Cobitis rubidipinnis and *semizonata*, Blyth, Proc. Asi. Soc. of Beng. 1860, pp. 170, 171.
Nemacheilus rubidipinnis and *semizonata*, Günther, Catal. vii, p. 348.

B. iii, D. 15-16($\frac{2}{13}$-$\frac{2}{14}$), P. 14, V. 8. A. 7($\frac{2}{5}$), C. 19.

Length of head $5\frac{1}{4}$, of caudal $5\frac{3}{4}$, height of body 6 in the total length. *Eyes*—in the middle of the length of the head, 2 diameters from the end of snout, and $1\frac{1}{2}$ apart. The greatest width of the head equals its length excluding the snout. (The spine-like process projecting from the middle of the upper lip is the end of the premaxillaries.) *Barbels*—the two rostral pairs reach to below the front edge of the eye. The maxillary pair are of about equal length. *Fins*—dorsal commences in advance of the ventral, and rather nearer the snout than the base of the caudal fin, its upper edge is oblique: pectoral as long as the head and reaching rather above 2/3 of the distance to the ventral, which last goes rather above 1/2 way to the anal. *Scales*—very distinct all over the body: 15 rows between the lateral-line and base of the ventral fin. Caudal nearly entire. *Colours*—reddish brown, with 12 to 16 irregular darkish bands descending from the back and ending in dark spots below the lateral-line: 4 to 6 oblique bands on the dorsal fin: 6 to 8 irregularly vertical bars on the caudal, which has a black ocellus on the upper half of its base.

Habitat.—Tenasserim. I am indebted to Dr. Anderson of the Calcutta Museum for the example figured.

4. Nemacheilus botia, Plate CLVI, fig. 5.

Cobitis botia and *bilturio*, Ham. Buch. Fish. Ganges, pp. 350, 358, 394, 395; Cuv. and Val. xviii, pp. 35, 72; Bleeker, Beng. p. 70.
Cobitis bimucronata, *ocellata* and *scaturigina*, McClell. Ind. Cyp. pp. 304, 435, 436, pl. 51, fig. 4, and 6 (from H. B.'s MS.)
Cobitis moreh, Sykes, Fishes of Deccan, T. Z. S. ii, p. 366: Bleeker, Beng. p. 70.
Somileptes unispina, Swainson, Fishes, ii, p. 311.
Nemacheilus botia and *urophthalmus*, Günther, Catal. vii, pp. 348, 349: Day, P. Z. S. 1869, p. 382.
Bil-turi and *Balli-potiah*, Assam; *Soon-da-lee*, Punj.

B. iii, D. 12-14($\frac{2}{10}$-$\frac{2}{12}$), P. 11, V. 8, A. 7($\frac{2}{5}$), C. 17.

Length of head $4\frac{1}{2}$ to $5\frac{1}{2}$, of caudal $4\frac{1}{2}$, height of body $4\frac{3}{4}$ in the total length. *Eyes*—diameter $3\frac{3}{4}$ to 4 in the length of head, $1\frac{1}{2}$ to $1\frac{3}{4}$ diameters from end of snout and $1\frac{1}{4}$ apart. The greatest width of the head equals half its length. Preorbital has in some specimens a projection which is movable below the orbit (*N. botia*), whilst in others it is entirely concealed by the skin (*N. bilturio*). *Barbels*—long, the maxillary pair reaching to below the posterior edge of the eye. *Fins*—dorsal commences rather nearer the snout than to the base of the caudal fin, whilst the length of its base equals that of the head, its upper edge nearly straight. Pectoral as long as the head. Ventral inserted under the middle of the dorsal, caudal slightly notched. *Scales*—distinct. *Lateral-line*—complete, 12 rows of scales between it and the base of the ventral fin. *Colours*—grayish, with from 10 to 14 short bars on the lateral-line, and a number of irregular blotches above it, sometimes forming bands over the back. Dorsal fin orange and with rows of black spots: caudal with about seven irregular bars of a $>$ shape, and a black ocellus on the upper portion of the base of the fin.

The *Cobitis scaturigina*, McClell. is an elongated variety, the height of the body being about $6\frac{1}{2}$ in the total. I have obtained it in Assam.

Variety, *Nemacheilus aureus*, Plate CLVI, fig. 4.

D. 11-12($\frac{2}{9}$-$\frac{2}{10}$). Dorsal fin of much less extent than in *N. botia*. Lateral-line ceases opposite the posterior end of the dorsal fin.

This form I consider cannot be a distinct species, as I have received three examples from Poona all with an incomplete lateral-line, whilst the number of rays in the dorsal fin were $\frac{2}{9\text{-}10\text{-}11}$, thus giving all the intermediate forms. The back is not quite so high as is usual, but I find some Assam examples show the intermediate links.

Habitat.—Sind, Punjab and throughout India (except the Malabar coast and South of the River Kistna),

Ceylon, common in Assam. Although the variety *N. aureus* is found in Assam, it is more abundant than *N. botia* in the upper portion of the Ganges and Jumna. It is also the form in the Nerbudda, and through the Deccan, where however the *N. botia* is likewise to be obtained.

5. Nemacheilus monoceros.

Cobitis monoceros, McClell. Ind. Cyp. pp. 305, 438, pl. 52. fig. 2; Cuv. and Val. xviii, p. 38; Bleeker, Beng. p. 70.

Nemacheilus monoceros, Günther, Catal. vii, p. 358.

B. iii, D. 12, P. 12, V. 8, A. 6, C. 18.

Length of head 1/4 of the total without the caudal fin. *Eyes*—situated behind the middle of the length of the head. *Fins*—(according to the figure): upper margin of dorsal nearly straight, caudal rounded. *Colours*—body greenish-yellow with a silvery lustre, opercles tinged with green. Caudal and dorsal streaked with numerous small brown bars.

Habitat.—Assam.

6. Nemacheilus pulchellus, Plate CLVI, fig. 7.

Day, Journ. Linn. Soc. xi, p. 528.

B. iii, D. 12($\frac{2}{10}$), P. 15, V. 9, A. 7($\frac{2}{5}$), C. 21.

Length of head $5\frac{1}{2}$, of caudal $4\frac{1}{2}$, height of body 5 in the total length. *Eyes*—rather small, in the middle of the length of the head, about two diameters from end of snout, and rather above one apart. Cleft of mouth reaches 1/2 way to below orbit. Anterior profile of head very abrupt. The greatest width of the head equals its length excluding the snout. *Barbels*—six, the rostral thicker than the maxillary pair, and none more than one diameter of the orbit in length. *Fins*—dorsal commences slightly nearer snout than base of caudal, its upper edge oblique: the fin equal to the height of the body below it. Pectoral as long as the head, its central rays the longest, it reaches 2/3 of the distance to the ventral, which latter extends nearly 3/4 of the way to the anal, the last laid flat reaching the base of the caudal which has sharp lobes. *Scales*—very minute, most apparent in the posterior portion of the body. *Lateral-line*—moderately distinct. *Colours*—this beautiful little loach is of grayish colour, becoming whitish below: there are along the side between the head and middle of the dorsal fin two rows of large, vertical, canary-yellow spots, having deep black margins: posterior to which they become wide vertical bands 2/3 as wide as the ground colour. Caudal with three or four oblique black bands, and a deep black spot at the centre of its base. Dorsal yellowish-orange at its upper anterior portion, two wide black bars along its centre, and one across the anal.

Habitat.—Bowany River to $2\frac{1}{2}$ inches in length.

7. Nemacheilus sinuatus, Plate CLVI, fig. 3.

Day, Proc. Zool. Soc. 1870, p. 371.

B. iii, D. 10-11($\frac{2}{8-9}$), P. 12, V. 8, A. 7($\frac{2}{5}$), C. 18.

Length of head 5, of caudal $5\frac{1}{2}$ to 6, height of body 6 in the total length. *Eyes*—situated slightly before the middle of the length of the head, $2\frac{1}{2}$ diameters from end of snout, $1\frac{1}{2}$ diameters apart. The greatest width of the head equals its length excluding the snout. *Barbels*—long and thin. *Fins*—dorsal arises slightly in advance of the ventrals, and midway between the snout and the base of the caudal, which last is cut square, but some of the outer rays are rather the shortest. *Scales*—distinct: 10 rows between the lateral-line and the base of the ventral fin. *Lateral-line*—ceases opposite the middle or end of the dorsal fin. *Colours*—olive, with irregular vertical brown bands, having shorter intermediate ones. A black ocellus at the upper portion of the base of the caudal fin. Dorsal yellow, with three or four rows of black spots. Caudal orange with four > shaped bars, the centre of each of which is inverted.

Habitat.—Wynaad.

8. Nemacheilus guentheri, Plate CLVI, fig. 10.

Day, Proc. Zool. Soc. 1867, p. 285; Günther, Catal. vii, p. 361.

B. iii, D. 10-11($\frac{2}{7-8}$), P. 11, V. 7, A. 7($\frac{2}{5}$) C. 19.

Length of head $5\frac{1}{2}$, of caudal 6, height of body 7 in the total length. *Eyes*—situated just before the middle of the length of the head, $1\frac{1}{2}$ diameters from end of snout, 1 diameter apart. Width of the head equals its length behind the orbit. Free portion of tail longer than deep. *Fins*—upper margin of dorsal oblique, the fin commences about midway between the end of the snout and the base of the caudal, which last is lobed. Pectoral extends three-fifths of the distance to the base of the ventral. *Scales*—small, but distinct. *Lateral-line*—incomplete. *Colours*—pinkish, coarsely reticulated with olive brown markings, leaving three rows of large spots along the side: a black band at the base of the caudal fin, which has two indistinct dark bands across either lobe, the extremities of which are stained. Two rows of fine black dots along the dorsal fin, and one across the anal.

Habitat.—Rivers along the lower slopes and base of the Neilgherry hills.

9. Nemacheilus semiarmatus, Plate CLVI, fig. 11.

Day, Proc. Zool. Soc. 1867, p. 286; Günther, Catal. vii, p. 353.

B. iii, D. 10-11$(\frac{2-3}{8})$, P. 12, V. 7, A. $7(\frac{2}{5})$, C. 18.

Length of head $5\frac{1}{4}$, of caudal $5\frac{1}{2}$, height of body $5\frac{1}{2}$ in the total length. *Eyes*—diameter $4\frac{1}{2}$ in the length of head, $1\frac{1}{2}$ diameters from end of snout, 1 diameter apart. The greatest width of the head equals its length excluding the snout. Free portion of tail as deep as long. *Fins*—origin of dorsal midway between the snout and the base of the caudal. Pectoral as long as the head, the basal half of some of its outer rays being generally stiffened by osseous matter. Caudal lobed in its last half. *Scales*—minute, becoming most distinct in the last half of the body. *Lateral-line*—complete. *Colours*—light brown, with numerous irregularly shaped spots and bars proceeding from the back towards the lateral-line: head brownish, with a dark line from the snout through the orbit. Dorsal fin with about three rows of dark spots: caudal irregularly barred: a dark line runs along the centre of the back.

Habitat.—Bowany and Seegoor rivers along the base of the Neilgherry hills: also imported into tanks on those mountains.

10. Nemacheilus corica, Plate CLVI, fig. 1.

Cobitis corica, Ham. Buch. Fish. Ganges, pp. 359, 395; Cuv. and Val. xviii, p. 36; Bleeker, Beng. p. 70.

Schistura punctata, McClell. Ind. Cyp. pp. 308, 442, pl. 53, f. 4 (from H.B.'s MS).

Acoura cinerea, Swainson, Fishes, ii, p. 310.

Nemacheilus corica, Günther, Catal. vii, p. 361.

Khorika, Beng.

B. iii, D. $10(\frac{2}{8})$, P. 13, V. 8, A. $7(\frac{2}{5})$, C. 17.

Length of head $5\frac{1}{2}$, of caudal 5, height of body 6 in the total length. *Eyes*—of moderate size, in the middle of the length of the head: nearly 2 diameters from the end of the snout. The greatest width of the head equals its length excluding the snout. *Barbels*—thin, the external rostral pair longer than the orbit. *Fins*—dorsal commences anterior to the ventral and nearer to the snout than to the base of the caudal, which last is lobed in its posterior half, the lower being the longer: upper margin of dorsal fin oblique. Third and fourth pectoral rays produced, reaching the base of the ventral fin. *Scales*—visible in the posterior half of the body. *Colours*—bluish, with about thirteen black blotches along the middle of the side, and smaller ones above and descending to between them: usually a silvery band along the middle of the side.

Habitat.—N.E. Bengal, Punjab and Assam.

11. Nemacheilus rupicola, Plate CLIII, fig. 9.

Schistura rupicola, McClelland, Journ. Asiat. Soc. Beng. vii, pl. 55 f. 3, and Ind. Cyp. pp. 309, 441, pl. 57, f. 3.

Cobitis rupecula, Cuv. and Val. xviii, p. 40; Bleeker, Beng. p. 70.

? Cobitis microps, Steind. Verh. Zool. Bot. Ges. Wien, 1866, p. 794, t. 13, f. 3.

Nemacheilus rupecula and *? microps*, Günther, Catal. vii, pp. 351, 357.

Saunt-al, Punj.

B. iii, D. 9-11$(\frac{2}{7}-\frac{3}{8})$, P. 10, V. 8, A. $7(\frac{2}{5})$, C. 18.

Length of head $5\frac{1}{2}$, of caudal 6, height of body 7 to 8 in the total length. *Eyes*—small, in the middle of the length of the head: the width of the interorbital space equals about 3/4 the length of the snout. Head nearly as wide as long. Mouth transverse and snout obtuse in the adult. Free portion of tail not as deep as long. *Fins*—the dorsal's upper margin oblique, it commences midway between the nostrils and the base of the caudal fin: pectoral extends a little above half the distance to the ventral. Caudal emarginate. *Scales*—absent, or minute in the posterior half of the body. *Lateral-line*—complete. *Colours*—yellowish, with 12 to 17 vertical brown bands, much narrower than the intermediate ground colour, and decreasing in width below the lateral-line, they are sometimes incomplete as shown in the figure: a wide dark band across the base of the caudal, which fin as well as the dorsal has several rows of spots forming bands: a dark mark at the base of the anterior dorsal rays, sometimes another at the base of the middle ones.

Habitat.—Himalayas and ? Tibet at 16,000 feet above the sea.

12. Nemacheilus montanus, Plate CLIII, fig. 6.

Schistura montana, McClell. Ind. Cyp. pp. 307, 440, t. 57, f. 1.

Cobitis montana, Cuv. and Val. xviii, p. 69; Bleeker, Beng. p. 70.

Saunt-at, Punj.

B. iii, D. 9-10$(\frac{2}{7}-\frac{}{8})$, P. 10, V. 7, A. $7(\frac{2}{5})$, C. 19.

Length of head $5\frac{1}{2}$ to $5\frac{2}{3}$, of caudal 5 to 6, height of body $8\frac{1}{2}$ in the total length. *Eyes*—small,

diameter 1/5 of the length of the head and situated before the middle of its length, rather above 1 diameter apart. The greatest width of the head equals its length, excluding the snout which is rather pointed. The preorbital is in the form of an obtuse moveable projection, which is sometimes covered by skin. *Barbels*—short, but stout. *Fins*—dorsal commences midway between the posterior margin of the orbit and the base of the caudal fin. Pectoral reaches above half way to the root of the ventral: caudal with rounded lobes in the adult, more pointed in the young. Free portion of the tail 2/3 as deep as long. *Scales*—minute. *Colours*—eleven to twelve vertical brown bands, each from nearly as wide to three times as broad as the buff interspaces. Caudal with a black band at its base, and a bar across each lobe. Dorsal with a black base and a black mark at the base of its two first rays, and a dark bar across its centre.

Nemachilus montanus, Günther, although closely resembling the typical form, is not this species, but *N. multifasciatus*. His description is from two specimens in the British Museum which are thus noted in the catalogue. "Simla. *ab.* Probably the typical specimens, from the collection of the East India Company." This supposition I consider incorrect: the specimens were from the collection of the East India Company, but without any locality attached. McClelland (Calcutta Journal Natural History, 1842, ii, p. 573), enumerates the species he sent to Europe up to that time, and the only loaches were, 1 *Cobitis Boutanensis* and 1 *C. marmorata*: and in the Chronological list of the contributions to the Museum at the Indian house (see preface to the Catalogue of Mammalia, 1851), it will be seen that he only sent one collection. However, many fish from other parts were received at various periods, but as this species appears to be absent from Simla, I prefer confining McClelland's two names of Simla species to the two forms of loaches now found there, and which agree moderately well with his descriptions.

Habitat.—Himalayas: attaining at least $4\frac{1}{2}$ inches in length.

13. Nemacheilus striatus, Plate CLIII, fig. 8.

Day, Proc. Zool. Soc. 1867, p. 347; Günther, Catal. vii, p. 353.
Cul-irum, and *Kul-nakura*, Tamil.

B. iii, D. 11-12($\frac{2}{9}$-$\frac{2}{10}$), P. 11, V. 8, A. 7($\frac{2}{5}$), C. 17.

Length of head $5\frac{1}{2}$ to 7, of caudal 6 to 7, height of body 8 to 9 in the total length. *Eyes*—in the middle of the length of the head, two diameters from the end of snout and $1\frac{1}{2}$ apart. The greatest width of the head equals 1/2 its length. *Barbels*—well developed, the external rostral pair reaching the posterior, and the internal to the anterior margin of the eye: whilst the maxillary one extends to the hind edge of the orbit. *Fins*—dorsal arises slightly in advance of the ventrals, and nearer the snout than the base of the caudal fin: the caudal slightly lobed at its posterior extremity. *Scales*—developed, especially in the posterior part of the body. *Lateral-line*- well marked: 15 rows of scales between it and the base of the ventral fin. *Colours*—light reddish brown, with narrow vertical bands darker than the ground colour, and most distinct in the posterior portion of the body, where there are from 12 to 16 behind the commencement of the dorsal fin, and several more between that and the head, which last is marked all over with black lines and spots. A black band at the base of the caudal fin. Dorsal brilliant orange, with a black edge having a light external margin, and a dark base: or else one or two rows of spots. Anal orange with some dull black spots: caudal likewise yellow and spotted in two rows.

Habitat.—Wynaad at 3000 feet elevation. It attains $2\frac{1}{2}$ inches in length.

14. Nemacheilus multifasciatus, Plate CLIII, fig. 7.

? *Schistura subfusca*, McClelland, Ind. Cyp. pp. 308, 443, pl. 53, f. 5.
? *Cobitis subfuscus*, Cuv. and Val. xviii, p. 80; Bleeker, Beng. p. 70.
Nemachilus montanus, Günther, Catal. vii, p. 350 (not *Schistura montana*, McClelland).
Nemachilus subfuscus, Günther, l. c. p. 351.

B. iii, D. 10($\frac{2}{8}$), P. 11, V. 9, A. 7($\frac{2}{5}$), C. 18.

Length of head $5\frac{1}{2}$, of caudal $5\frac{1}{4}$, height of body 6 in the total length. *Eyes*—situated partly before the middle of the length of the head, $2\frac{1}{2}$ to $2\frac{2}{3}$ diameters from end of snout and $1\frac{1}{4}$ apart. No enlargement of the preorbital, Snout compressed. Mouth narrow. *Barbels*—the maxillary pair rather longer than the eye, the two rostral pairs slightly shorter. *Fins*—dorsal commences about midway between the end of the snout and the base of the caudal fin, which latter is lobed in its last fourth. Pectoral reaches half way to the ventral. *Scales*—small, most distinct in the last half of the body. *Lateral-line*—complete. *Colours*—vertical bands as wide as the ground colour, pass from the back to the lower surface of the abdomen, those between the head and the dorsal fin are numerous, whilst there are about five posterior to it. In some examples these anterior bands coalesce. A dark band at the base of the caudal and dark marks on the head radiating from the eye. Fins yellow, the dorsal with four bands of spots and an equal number or more on the caudal. Ventral and anal with two bands each.

Habitat.—Darjeeling and Assam. The example figured (life size) was from Darjeeling.

15. Nemacheilus Denisonii, Plate CLIII, fig. 5.

Cobitis montanus, Jerdon, M. J. L. and S. 1849, p. 332 (not McClelland).

Nemacheilus Denisonii, Day, Proc. Zool. Soc. 1867, p. 287; Günther, Catal. vii, p. 352.

B. iii, D. $10(\frac{2}{8})$, P. 11, V. 7, A. $7(\frac{2}{5})$, C. 17.

Length of head 5 to $5\frac{1}{2}$, of caudal $5\frac{1}{2}$, height of body $6\frac{1}{2}$ in the total length. *Eyes*—situated in the anterior half of the head, diameter 1/6 of length of head, 2 diameters from end of snout, and also apart. The greatest width of the head equals its length excluding the snout. *Barbels*—the maxillary extend to the opercle, the rostral pairs are shorter. *Fins*—the dorsal commences midway between the end of snout and base of caudal, which last is lobed. Pectoral extends rather above 1/2 the distance to the ventrals. *Scales*—minute. *Lateral-line*—complete. *Colours*—reddish brown, having from nine to twelve dark vertical zones, those anterior to the dorsal fin sometimes coalescing rather irregularly across the back. Dorsal fin with three rows of fine black spots and a black base. Caudal irregularly spotted in bands. Some dull spots on the ventral and anal fins. Most of the head marbled with black dots.

There is a variety of this fish at Poona and elsewhere in the Deccan, its dorsal and caudal fins are more spotted, whilst its body bands are more numerous having less width of ground colour.

Habitat.—Neilgherry and Coorg hills, and rivers at their bases; Mysore and the Deccan. The example figured was from the Neilgherries.

16. Nemacheilus notostigma.

Bleeker, Verh. Holl. Maatsch. Haarl. 1864, Cobit. et Cyp. Ceylon, p. 5, t. i, fig. 2; Günther, Catal. vii, p. 352.

B. iii, D. $10(\frac{2}{8})$, V. 7, P. 13, A. $7\text{-}8(\frac{2-3}{5})$, C. 19.

Length of head $5\frac{1}{3}$ to 6, of caudal 5, height of body $5\frac{2}{3}$ in the total length. *Eyes*—diameter 5 in length of head, 2 diameters from end of snout, $1\frac{1}{4}$ apart. Snout compressed and pointed. *Barbels*—all rather longer than the eye. *Fins*—dorsal highest in front, it arises midway between the snout and base of caudal fin, being a little in advance of the ventrals: it is not quite so high as the body below it. Pectoral nearly as long as the head. Caudal lobed in its posterior third. *Scales*—indistinct. *Colours*—with ten to fourteen vertical bands on the body, broader than the interspaces. A dark mark at the base of the caudal, which is banded. A black spot at the base of the anterior dorsal rays, and a bar across the lower portion of the fin in its last half, a single band across its centre.

This fish is very similar to *N. Denisonii*, but has a shorter head, a more compressed snout and rather a lower dorsal fin. *N. multifasciatus* is also very similar, but has a much smaller eye.

Habitat.—Ceylon.

17. Nemacheilus zonalternans.

Cobitis zonalternans, Blyth, J. A. S. of B. 1860, p. 172.
Nemacheilus zonalternans, Day, Proc. Zool. Soc. 1869, p. 551.

B. iii, D. 2/9, A. $11(\frac{2}{9})$P. 11, V. 9, A. $7(\frac{2}{5})$, C. 19.

Eyes—of moderate size, rather above 1 diameter from end of snout. *Fins*—dorsal arises anterior to the insertion of the ventral, and rather nearer the snout than the base of the caudal, which latter fin is entire. *Scales*—distinct. *Colours*—ten to eleven bars descend down the lower 2/3 of the body to the abdomen, with intermediate half bands superiorly between them. Dorsal and caudal fins spotted in bands.

Habitat.—Tenasserim Provinces, from whence Major Berdmore sent two specimens, 1·4 and 1·6 inches respectively in length.

18. Nemacheilus ladacensis.

Günther, Catal. vii, p. 356; Day, Proc. Zool. Soc. 1876, p. 747, and Fishes, Yarkand, plate iv, fig. 4.

B. iii, D. $10(\frac{2}{8})$, V. 9, A. $8(\frac{2}{6})$, C. 19.

Length of head 5, of caudal $5\frac{1}{4}$, height of body $5\frac{1}{2}$ in the total length. *Eyes*—diameter 5 to $5\frac{1}{2}$ in length of head, $2\frac{1}{2}$ diameters from end of snout and 2 apart. Free portion of tail 1/2 as high as long. *Barbels*—the maxillary ones scarcely reach the front edge of the eye, the longest rostral ones to below the front nostril. *Fins*—upper margin of dorsal oblique, with its anterior angle rounded, it commences between the front edge of the eye and the root of the caudal, which latter is emarginate. Pectoral extends rather above half way to the base of the ventral. *Scales*—absent. *Colours*—of a light fawn, with 16 or 18 interrupted darker and sinuous bands passing from the back down the sides: a silvery lateral band. Dorsal and caudal finely spotted in lines: a darkish band on pectoral, ventral, and anal fins.

Habitat.—Tibet, from whence two specimens were procured.

19. Nemacheilus zonatus, Plate CLVI, fig. 2.

Schistura zonata, McClell, Ind. Cyp. pp. 308, 441, pl. 53, fig. 1.
Cobitis zonata, Cuv. and Val. xviii, p. 39; Bleeker, Beng. p. 72.
Nemacheilus mugah, Day, Proc. Zool Soc. 1869, p. 382.
Mugah, Beng.

B. iii, D. $9(\frac{2}{7})$, P. 11. V. 8, A. $7\text{-}8(\frac{2}{5\text{-}6})$, C. 17, L. l. 110.

Length of head 5, of caudal 5, height of body $6\frac{1}{2}$ in the total length. *Eyes*—diameter 1/5 of length of head, two diameters from end of snout, $1\frac{1}{2}$ diameters apart. Body with rather compressed sides. The free portion of the base of the caudal rather longer than high. Snout pointed: no enlargement of pre-orbital. The greatest width of the head equals its postorbital length. *Barbels*—all about as long as the eye. *Fins*—dorsal arises midway between snout and base of caudal, its upper margin is straight: pectorals extend a little above half way to the base of ventrals: caudal forked. *Scales*—small, but distinct: there being twelve rows above the lateral-line, and thirteen between it and the base of the ventral fin. *Lateral-line*—commences by two roots, which soon coalesce, when it is continued to the base of the caudal. *Colours*—yellowish, with a green tinge: about fifteen brown bands, one-third as wide as the ground colour, pass across the back and descend on either side below the lateral-line: a few near the head, and some in the posterior third of the body are interrupted. Upper surface of head marbled with black. Fins immaculate, but the two first anal rays are black anteriorly, and there are also slight black marks near the end of the ventrals and on the outer side of the pectorals. Rostral barbels orange. The *young* have a wide silvery band along the side, ending in a dark mark at the base of the caudal fin.

Habitat.—Throughout the Jumna and Ganges rivers and their affluents, Bheer Bhoom, Assam and Orissa. It attains at least two inches in length: the example figured (life-size) was from Midnapore.

20. Nemacheilus cincticauda, Plate CLVI, fig. 6.

Cobitis cincticauda, Blyth, J. A. S. of B. 1860, p. 172.
Nemacheilus cincticauda, Day, Proc. Zool. Soc. 1869, p. 552.

B. iii, D. 10($\frac{2}{8}$), P. 11, V. 8, A. 7($\frac{2}{5}$), C. 19.

Length of head $5\frac{1}{4}$, of caudal $4\frac{1}{2}$, height of body $6\frac{1}{2}$ to 7 in the total length. *Eyes*—situated in the middle of the length of the head, 2 diameters from end of snout, $1\frac{1}{4}$ diameters apart. Preorbital projecting and with a free lower edge in some but not in all examples. *Barbels*—well-developed, the maxillary reaching to below the front edge of the orbit. The free portion of the tail longer than high. *Fins*—dorsal with its upper margin straight, it arises nearer the snout than the base of the caudal, which last is slightly forked with pointed lobes. Pectoral extends three-fourths of the distance to the ventral. *Scales*—minute. *Colours*—yellowish, with ten regular brown zones encircling the body, and sometimes but not always broader than the ground colour, or the bands may be broken up and irregular: a dark bar at the base of the caudal, and a dark band between the eye and the snout: occasionally a dark mark on the opercle. Dorsal with some black spots.

Habitat.—Burma. The example figured was from Prome.

21. Nemacheilus triangularis, Plate CLIII, fig. 10.

Day, Proc. Zool. Soc. 1865, p. 295, and Fishes of Malabar, p. 203, pl. 14, fig. 1; Günther, Catal. vii, p. 352.

B. iii, D. 10($\frac{2}{8}$), P. 11, V. 9, A. 7($\frac{2}{5}$), C. 19.

Length of head $5\frac{1}{3}$, of caudal $5\frac{1}{3}$, height of body 6 in the total length. *Eyes*—diameter $4\frac{3}{4}$ in length of head, 2 diameters from end of snout and 1 apart. The greatest width of the head equals half its length. *Barbels*—of moderate length. *Fins*—upper margin of dorsal fin oblique, it commences midway between the end of the snout and the base of the caudal, which latter is emarginate. *Scales*—small but distinct in the last portion of the body: upwards of 20 rows between the lateral-line and base of the ventral fin. *Lateral-line*—complete. *Colours*—yellowish, with about seven black-edged bands on the body and head disposed in a > shape. Dorsal with three irregular rows of black spots. Pectoral, ventral, and anal unspotted, but stained at their margins. Several oblique bars across each lobe of the caudal which has a black mark at its base.

Habitat.—Travancore hills.

22. Nemacheilus savona, Plate CLV, fig. 8.

Cobitis savona, Ham. Buch. Fish. Ganges, pp. 357, 394; McClelland, Ind. Cyp. pp. 308, 442, pl. 53, fig. 3 (from H. B.'s MS.); Cuv. and Val. xviii, p. 32; Bleeker, Beng. p. 70.
Acoura obscura, Swainson, Fishes, ii, p. 310.
Nemachilus savona, Günther, Catal. vii, p. 354.
Savon-khorka, Beng.

B. iii, D. 10-11($\frac{2-3}{8}$), P. 10, V. 7, A. 7($\frac{2}{5}$), C. 18.

Length of head $4\frac{1}{2}$ to $4\frac{3}{4}$, of caudal $5\frac{1}{2}$ to 6, height of body 6 in the total length. *Eyes*—rather large, rather behind the middle of the length of the head, 2 diameters from the end of snout, and $1\frac{1}{4}$ apart. Head, as broad as it is long without the snout. *Barbels*—long, the rostral and maxillary ones reach the eye. *Fins*—dorsal with its upper edge rather convex, it arises midway between the anterior edge of the orbit and the base of the caudal fin, and its commencement is before the origin of the ventrals. Pectoral extends two-thirds of the distance to the ventral, which last scarcely reaches half way to the anal. Caudal very slightly emarginate, its lobes being rounded. *Lateral-line*—incomplete. *Scales*—small, most distinct in the posterior portion of the body. *Colours*—purplish, becoming lighter on the abdomen, having from ten to twelve very

narrow vertical white bands, not above 1/8 or 1/6 as wide as the ground colour, a black band at the root of the caudal fin; a black blotch at the base of the first few dorsal rays, on to which the white body bands are continued, and four or five rows of dark spots on the fin. Caudal with narrow bands of dark spots: two bands also on the ventral and anal fins.

Habitat.—Bengal and N. W. Provinces. I received some specimens from the hills near Ranigunj. The example figured (life-size) was from the N.W. Provinces.

23. Nemacheilus Beavani, Plate CLVI, fig. 8.

Nemachilus beavani, Günther, Catal. vii, p. 350.
Nemacheilus chryseus, Day, Journ. Linn. Society, Zool. xi, p. 529.

B. iii, D. 10($\frac{2}{8}$), P. 11, V. 7, A. 7($\frac{2}{5}$), C. 19.

Length of head 5, of caudal $5\frac{3}{4}$, height of body $5\frac{1}{2}$ to $5\frac{3}{4}$ in the total length. *Eyes*—small, just before the middle of the length of the head. The greatest width of the head equals half its length. Preorbital not enlarged. Free portion of the tail as long as deep. *Barbels*—six, four rostral and two maxillary. *Fins*—dorsal with an oblique upper edge, it arises slightly nearer the end of the snout than the base of the caudal. Pectoral extends two-thirds of the distance to the root of the ventral. Caudal lobed. *Scales*—minute. *Colours*—body with nine dark cross bands, broader than the lighter interspaces, a black streak across the root of the caudal. Dorsal and caudal rays with blackish dots. The bands appear to be absent in some specimens.

Habitat.—Bowany river in Madras and Mysore, also Orissa. The example figured (life-size) was from the Bowany.

24. Nemacheilus spilopterus, Plate CLIII, fig. 9.

Cobitis spilopterus, Cuv. and Val. xviii, p. 27, pl. 522.
Nemachilus spilopterus, Günther, Catal. vii, p. 358.

B. iii, D. 9-10($\frac{2}{7-8}$), P. 15, V. 7, A. 7($\frac{2}{5}$), C. 19.

Length of head $5\frac{3}{4}$ to 6, of caudal $6\frac{1}{2}$ to 7, height of body $8\frac{1}{2}$ to 9 in the total length. *Eyes*—near the summit of the head and in or rather before the middle of its length, 2 diameters from end of snout, and $1\frac{1}{2}$ apart. No enlargement of the preorbital. *Barbels*—short. Free portion of tail about twice as long as high. *Fins*—dorsal with an oblique upper margin, it commences midway between the end of the snout and the root of the caudal. Pectoral reaches half way to the base of the ventral. Caudal slightly emarginate. *Scales*—absent. *Colours*—greenish yellow, with from eleven to fifteen irregular bands crossing the back, and a black band across the root of the caudal fin. A black blotch at the base of the three first dorsal rays, two bands along the fin, another along its base, and three on caudal.

This species is very closely allied to *N. montanus*, differing in the form of the head, size of the eye, and pectoral fin, also in the markings of the dorsal and caudal.

Habitat.—Himalayas, Assam, and Cochin China.

25. Nemacheilus marmoratus, Plate CLV, fig. 9.

Cobitis marmorata, Heckel, Fisch. Kaschmir, p. 76, t. 12, figs. 1—2, and Hügel, Kaschmir, iv, p. 380; Cuv. and Val. xviii, p. 41; Bleeker, Beng. p. 70.
Cobitis vittata, Heckel, l. c. p. 80, figs. 3, 4; and Hügel, Kaschmir, iv, p. 382; Cuv. and Val. xviii, p. 42; Bleeker, Beng. p. 72.
Nemachilus marmoratus, Günther, Catal. vii, p. 356; Day, Proc. Zool. Soc. 1876, p. 798.

B. iii, D. 9($\frac{2}{7}$), P. 11, V. 7, A. 7($\frac{2}{5}$), C. 17.

Length of head $4\frac{3}{4}$ to 5, of caudal 5, height of body 7 in the total length. *Eyes*—situated in the middle of the length of the head: two diameters from the end of snout. Free portion of tail from $1\frac{1}{2}$ to 2 times as long as high. *Fins*—upper margin of dorsal fin oblique, commencing midway between the end of the snout and the root of the caudal, which latter is somewhat convex or cut square at its extremity. Pectoral reaches half way to the root of the ventral. *Scales*—absent. *Colours*—marbled or irregularly blotched and mottled with brown. Fins more or less spotted. In some specimens a dark band exists along the body and some bars over the back of the tail. (*N. vittata.*)

Habitat.—Cashmere Lake.

26. Nemacheilus Stoliczkæ, Plate CLV, fig. 10.

Cobitis Stoliczkæ and *tenuicauda*, Stein. Verh. zool-bot. Ges. Wien, 1866, p. 793, t. 14, fig. 2, and t. xvii. f. 3.
Nemachilus tenuicauda, *Stoliczkæ* and *Griffithii*, Günther, Catal. vii, pp. 357, 360.
Nemacheilus Stoliczkæ, Day, Proc. Zool. Soc. 1876, p. 795, Fishes of Yarkand, Plate v, fig. 2.

B. iii, D. 9($\frac{2}{7}$), P. 13, V. 8, A. 7($\frac{2}{5}$), C. 15.

Length of head 6, height of body 8 in the total length. *Eyes*—diameter 8 in length of the head, 3 diameters

from end of snout and 2 apart. *Barbels*—the maxillary the longest and reach to below the hind edge of the eye. *Fins*—origin of dorsal nearer root of caudal than end of snout, its upper margin oblique with the anterior corner rounded. Pectoral extends a little above half way to the root of the ventral. Caudal slightly emarginate. *Scales*—absent. *Colours*—grayish along the back, becoming lighter beneath, marbled all over with dark green or black spots or bands. Dorsal, caudal, and sometimes outer pectoral rays barred.

The examples of *N. griffithii* in the British Museum* belong to this species. The chief point of difference between the two descriptions appears to have consisted in the *N. Stoliczkæ*, being "scaleless," and the *griffithii* having "scales" which, however, it has not. Having drawn the author's attention to the discrepancy between what exists and the text of the catalogue, he has been good enough to inform me that "scales" as appertaining to the species must be a misprint for "scaleless."

Habitat.—Leh or Ladak and waters going directly into the Indus near its source, and Tibet, also Yarkand where the streams go into the Yarkand river.

27. Nemacheilus Blythii.

Day, Proc. Zool. Soc. 1869, p. 552.

B. iii, D. 9($\frac{2}{7}$), V. 9, A. 7($\frac{2}{5}$), C. 19.

Length of head 5, of caudal 5, height of body $6\frac{1}{2}$ in the total length. *Eyes*—diameter 2/9 of length of head, 1 diameter from end of snout, $1\frac{1}{4}$ apart. *Barbels*—longer than the orbit. *Fins*—dorsal commences midway between the snout and the base of the caudal fin, which latter has sharp lobes. *Scales*—minute. *Colours*—brownish, becoming lighter on the abdomen; a dark band at the base of the caudal.

Habitat.—Doubtful. Two specimens 3 inches long exist in the Calcutta Museum.

28. Nemacheilus Butanensis.

Cobitis Boutanensis, McClell. C. J. N. H. ii, p. 586; Bleeker, Beng. p. 70.
Nemachilus butanensis, Günther, Catal. vii, p. 358.

B. iii, D. 9, V. 7, A. 7.

Length of head $5\frac{1}{2}$, of caudal $5\frac{1}{2}$, height of body 7 in the total length. *Eyes*—small, in the middle of the length of the head. Free portion of tail elongated and compressed, its depth being 2/3 of its length. *Fins*—upper margin of dorsal convex, it commences nearer to the end of the snout than to the root of the caudal, which latter is rounded. The pectoral does not extend half way to the base of the ventral. *Scales*—distinct. *Colours*—doubtful.

Habitat.—Boutan, where it attains 5 inches in length. McClelland's type in the British Museum is in a bad state, and quite unfit to figure from.

29. Nemacheilus gracilis.

Day, Proceedings Zoological Soc. 1876, p. 798, and Fishes of Yarkand, Plate iv, fig. 5.

B. iii, D 9($\frac{2}{7}$), P. 13, V. 8, A. 8($\frac{2}{6}$), C. 17.

Length of head $5\frac{1}{2}$, of caudal $6\frac{1}{3}$, height of body $6\frac{1}{3}$ in the total length. *Eyes*—diameter 11 in length of head, 4 diameters from end of snout, and $2\frac{1}{2}$ apart. The greatest width of the head equals its length excluding the snout. *Barbels*—the maxillary ones about twice as long as the eye, the outer rostral pair reach the hind nostril: the inner are shorter. *Fins*—dorsal commences midway between the eye and base of the caudal fin, its upper edge is nearly straight, it is not quite so high as the body below it. Pectoral not quite so long as the head, it reaches rather above half way to the ventral, which latter is inserted somewhat in advance of the origin of the dorsal and extends 1/2 way to the anal. Anal laid flat reaches 1/2 way to the base of the caudal, which latter is slightly emarginate. Free portion of the tail half as high at its base as it is long. *Scales*—absent. *Colours*—brownish along the back, becoming yellowish beneath: dorsal and caudal with dull spots.

Habitat.—Basgo on the head waters of the Indus.

30. Nemacheilus turio.

Cobitis turio, Ham. Buch. Fish. Ganges, pp. 358, 395; Cuv. and Val. xviii, p. 33; Bleeker, Beng. p. 70
Cobitis gibbosa, McClell. Ind. Cyp. pp. 304, 436, pl. 52, fig. 7 (from H. B.'s MS.)
Cobitis arenata, Val. in Jacq. Voy. Ind. Poiss. pl. 15, fig. 1; Cuv. and Val. xviii, p. 28; Bleeker, Beng. p. 70.
Acoura argentata, Swainson, Fishes, ii, p. 310.
Nemachilus turio, Günther, Catal. vii, p. 360.
Turi, Assam.

* The first fishes brought me as types of *N. griffithii*, were examples of Genus *Lepidocephalichthys*, whereupon I suggested a transposition of labels had occurred: a month subsequently two others were produced as the real types and which I have considered such, as their lengths agreed with what had been asserted in the Catalogue.

B. iii, D. 8 (10?), P. 12, V. 8, A. 7, C. 19.

Length of head (according to figure) about 1/5, of caudal 1/5, height of body 1/5 of the total length. *Eyes*—of moderate size. Free portion of tail appears higher than long. Back elevated. *Fins*—dorsal commences midway between the end of the snout and the base of the caudal fin: pectoral nearly reaches the ventral. Caudal emarginate. *Colours*—body irregularly spotted and blotched.

Habitat.—Assam, said to have been taken at Goalpara.

31. Nemacheilus guttatus.

Cobitis guttata, McClell. Ind. Cyp. pp. 305, 438, pl. 52, fig. 5, 6; Cuv. and Val. xviii, p. 79; Bleeker, Beng. p. 70.

Nemachilus guttatus, Günther, Catal. vii, p. 360.

B. iii, D. 8.

This species is said to have only four barbels. *Colours*—light green with dark blotches.

Habitat.—Joorhath in Upper Assam.

FAMILY, VI—CLUPEIDÆ, *Cuvier*.

Gill-openings usually very wide: pseudobranchiæ, when present, well developed. Abdomen mostly compressed, generally into a sharp edge, and usually serrated. Opercular pieces four. Eyes lateral, with or without adipose lids. Margin of the upper jaw formed mesially by the premaxillaries, laterally by the maxillaries, which are composed of three pieces not ossified together. Mouth may have a deep cleft, with small premaxillaries and the maxilla elongated, and either the upper or lower jaw projecting: or the mouth may be transverse. Barbels absent. Fin rays articulated. A single dorsal with a few or moderate number of weak rays: anal sometimes many-rayed. Scales on the body: as a rule none on the head. Lateral-line mostly absent. Stomach with a "cul de sac." Air-vessel more or less simple. Pyloric appendages, when present, numerous.

The herrings are well represented in the Seas of India, and are largely consumed by the native population. As a rule they are much more abundant along the Malabar than the Coromandel Coast. The oil Sardine *(Clupea longiceps)*, comes in vast numbers more especially to Malabar, but is uncertain as to its movements, occasionally being absent for many consecutive years, as will be alluded to under the head of the species. The Hilsa fish *(Clupea ilisha)*, at certain periods of the year ascends the larger rivers for the purpose of depositing its ova,* and is then captured in enormous quantities, its flesh being considered a great delicacy.

Geographical distribution.—The herrings are found in most seas and many enter fresh waters.

SYNOPSIS OF GENERA.

First group—Engrauliformes.

Upper jaw prominent. Mouth with a very deep cleft. Premaxillaries small and united to the maxillaries, the latter being elongated. Eyes covered by skin.

1. *Engraulis*—No pectoral filaments. Extent of union between the gill-membranes short. Abdomen serrated, p. 624.
2. *Coilia*—Upper pectoral rays produced into free filaments. Abdomen serrated, p. 630.

Second group—Chatoessiformes.

Mouth transverse, narrow, nearly or quite inferior, with the upper jaw projecting over the lower. Eyes with free adipose lids. Abdomen serrated.

3. *Chatoëssus.* Fourth branchial arch with an accessory organ, p. 632.

Third group—Clupeæformes.

Upper jaw not projecting. Eyes with free adipose lids. Abdomen serrated.

4. *Clupea*—Mouth antero-lateral. Teeth minute or absent. Abdominal serrature commencing at the thorax or pectoral fins, p. 634.
5. *Corica*—Mouth antero-lateral. Teeth when present rudimentary. Abdominal serrature commencing behind the pectoral fins, p. 641.
6. *Pellona*—Under jaw projecting and obtuse. Ventral fins present: anal elongated, p. 642.
7. *Opisthopterus*—Similar to *Pellona* but destitute of ventral fins, p. 646.
8. *Raconda*—Similar to *Pellona* but destitute of ventral and anal fins, p. 646.

Fourth group—Dussumieriæformes.

Mouth antero-lateral, the upper jaw not projecting. Eyes with free adipose lids. No osseous gular plates. Abdominal edge smooth.

9. *Dussumieria*—Dorsal opposite the ventral fin. Teeth small, but not deciduous, p. 647.
10. *Spratelloides*—Dorsal opposite the ventral fin. Teeth, if present, deciduous, p. 648.

Fifth group—Albulæformes.

Mouth inferior and of moderate width: upper jaw projecting. Teeth in jaws.

11. *Albula*—Branchiostegals numerous. Eyes with free adipose lids. Abdomen smooth and not serrated. Lateral-line distinct, p. 648.

* *Anadromous* is a term employed for such as live for the most part of the year in the sea, where they attain maturity, but deposit their ova in fresh waters. *Hind* "on the fisheries of Canada."

Sixth group—Elopsæformes.

Mouth antero-lateral, lower jaw the longer. An osseous gular plate. Abdomen rounded and smooth.

12. *Elops*—Pseudobranchiæ well developed. Scales small, p. 649.
13. *Megalops*—Pseudobranchiæ rudimentary or absent. Scales large, p. 650.

Seventh group—Chaninæformes.

Mouth anterior, transverse, small. Eyes subcutaneous. Teeth absent. Gill-membranes entirely united. Abdomen rounded and smooth.

14. *Chanos*. Scales small, p. 651.

First group—Engrauliformes.

Mouth with a very deep cleft: upper jaw prominent. Premaxillaries small and united to the maxillaries, the latter being elongated. Eyes covered by skin.

Genus 1—Engraulis, *Cuvier*.

Stolephorus, Lacépède: *Thryssa* and *Telara*, Cuvier: *Setipinna*, Swainson: *Pterengraulis*, *Lycengraulis*, *Lycothrissa* and *Heterothrissa*, Günther.

Branchiostegals short and rather numerous. Gill-openings wide, the membrane connecting the two sides being short, thus leaving the isthmus uncovered. Body oblong or elongated, compressed, and serrated along the abdominal edge. Cleft of mouth lateral: snout conical: the upper jaw the longer: maxillaries of varying length, but always long, having a membraneous attachment to the cheeks. Teeth small, sometimes of unequal size, usually present on the jaws, vomer, palatine and pterygoid bones. The dorsal fin may be wholly or partially in advance of or entirely posterior to the origin of the anal: the upper pectoral rays may or may not be prolonged: anal with many or a moderate number of rays. Scales large or of moderate size.

SYNOPSIS OF SPECIES.

a. Dorsal fin in advance of that of the anal.

1. *Engraulis Hamiltonii*, D. 1 + 13, A. 40-41, L. l. 44, L. tr. 11-12. Height of body $4\frac{1}{4}$ in the total length. Snout slightly projecting. Maxilla nearly reaches base of pectoral fin. Black venules on shoulder. Seas of India to Malay Archipelago.

2. *Engraulis Malabaricus*, D. 1 + 14-15, A. 40-43, L. l. 39-40, L. tr. 11-12. Height of body $3\frac{3}{4}$ in the total length. Snout slightly projecting. Maxilla reaches gill-opening. Venules on shoulder: pectoral fin sometimes black. Seas of India.

3. *Engraulis mystax*, D. 1 + 13-15, A. 35-38, L. l. 45, L. tr. 12. Height of body $4\frac{1}{2}$ to $4\frac{3}{4}$ in the total length. Snout projecting. Maxilla reaches base of pectoral fin. Venules on shoulder. Seas of India to Malay Archipelago.

4. *Engraulis Kammalensis*, D. 1 + 13-14, A. 34-38, L. l. 36-38, L. tr. 9-10. Height of body 4 in the total length. Snout projecting. Maxilla reaches gill-opening. Venules on shoulder. Seas of India.

5. *Engraulis boelama*, D. 14-16, A. 29-32, L. l. 41, L. tr. 8. Height of body 5 in the total length. Snout projecting very much. Maxilla reaches slightly behind mandibular joint. Bluish, becoming silvery on the sides. Red Sea through those of India to Mysol and Manado.

6. *Engraulis setirostris*, D. 1 + 14-16, A. 34-38, L. l. 36-44, L. tr. 11. Height of body $4\frac{1}{4}$ to 5 in the total length. Snout very slightly projecting: angle of mouth below hind edge of eye. Maxilla reaches end of ventral fin. Greenish, with silvery sides. Red Sea, Seas of India to Malay Archipelago.

7. *Engraulis Dussumieri*, D. 1 + 13-15, A. 34-36, L. l. 40-42, L. tr. 9. Height of body $4\frac{1}{4}$ to $4\frac{1}{2}$ in the total length. Snout considerably projecting: angle of mouth far behind the hind edge of the eye. Maxilla reaches to ventral fin. Seas of India to the Malay Archipelago.

b. Dorsal fin partly or entirely above the anal.

8. *Engraulis telara*, D. 1 + 14-15, A. 70-80, L. l. 52, L. tr. 14. Height of body $4\frac{1}{2}$ in the total length. Snout slightly projecting. Maxilla reaches gill-opening. Upper pectoral ray elongated. Fresh and brackish waters of Bengal and Burma.

9. *Engraulis breviceps*, D. 1 + 17, A. 60-64, L. l. 54-56, L. tr. 14. Height of body 4 to $4\frac{1}{2}$ in the total length. Lower jaw slightly prominent. Maxilla reaches mandibular joint. Upper pectoral ray elongated. Bay of Bengal to the Malay Archipelago.

10. *Engraulis taty*, D. 1 + 13-15, A. 51-57, L. l. 42-46, L. tr. 12. Height of body $3\frac{3}{4}$ to 4 in the total length. Snout slightly projecting. Maxilla reaches gill-opening. Upper pectoral ray elongated. Seas and estuaries of India to the Malay Archipelago.

11. *Engraulis purava*, D. 1 + 13, A. 45-47, L. l. 46, L. tr. 12. Height of body $4\frac{1}{4}$ to $4\frac{1}{2}$ in the total length. Snout not projecting. Maxilla reaches base of pectoral fin. Seas and estuaries of India to the Malay Archipelago.

12. *Engraulis Commersonianus*, D. 14-16, A. 19-21, L. l. 38-40, L. tr. 8-9. Height of body $5\frac{1}{4}$ to $5\frac{3}{4}$ in the total length. Snout projecting considerably. Maxilla reaches gill-opening. A broad, silvery, lateral band. Seas of India to the Malay Archipelago.

13. *Engraulis Indicus*, D. 15-16, A. 19, L. l. 40, L. tr. 8-9. Height of body 6 to $6\frac{1}{2}$ in the total length. Snout projecting considerably. Maxilla enlarged and truncated opposite mandibular joint. A broad, silvery, lateral band. Seas and estuaries of India to the Malay Archipelago.

14. *Engraulis tri*, D. 1 + 14-15, A. 20-22, L. l. 38, L. tr. 8. Height of body 5 to $5\frac{1}{4}$ in the total length. Snout projecting. Maxilla reaches gill opening. A silvery lateral band.

a. Origin of dorsal fin in advance of that of the anal.

1. **Engraulis Hamiltonii**, Plate CLVII, fig. 4.

Clupea, Russell, Fish. Vizag. ii, p. 72, and *Poorawah*, fig. 189.
Thryssa poorawah, Cuvier, Règne Anim.: Jerdon, M. J. L. and Sc. 1851, p. 145.
Thryssa Hamiltonii, Gray and Hard. Ill. Ind. Zool.
Thryssa subspinosa, Swainson, Fishes, ii, p. 293; Jerdon, M. J. L. and Sc. 1851, p. 145.
Engraulis Grayi, Bleeker, Haring. p. 41, and Ich. Riouw, p. 492; Kner, Novara Fische, p. 333.
Engraulis Hamiltonii, Cuv. and Val. xxi, p. 66; Bleeker, Beng. p. 74; Day, Fish. Malabar, p. 239; Günther, Catal. vii, p. 395.
Stolephorus Hamiltoni, Bleeker, Ceram, p. 261, and Atl. Ich. vi, t. 259, f. 5.
Engraulis poorawah, Bleeker, Atl. Ich. vi, p. 132.

B. xii, D 1 + 13($\frac{2}{11}$), P. 12, V. 7, A. 40-41($\frac{2}{37-39}$), C. 19, L. l. 44, L. tr. 11-12.

Length of head $5\frac{1}{4}$ to $5\frac{1}{2}$, of caudal $5\frac{1}{4}$, height of body $4\frac{1}{4}$ in the total length. *Eyes*—subcutaneous, $4\frac{1}{4}$ diameters in the length of the head, 3/4 of a diameter from the end of snout, and 1 apart. Snout slightly in advance of the end of the lower jaw: the maxilla enlarged opposite the mandibular joint and nearly reaching the base of the pectoral fin: opercle rather more than twice as high as wide. *Teeth*—fine ones in jaws, vomer, palate and on the tongue. *Fins*—dorsal commences about midway between the end of the snout and the base of the caudal fin, which latter has the lower lobe somewhat the longer. Pectoral reaches to above the middle of the small ventrals. Anal commences behind the vertical from the last dorsal ray. *Scales*—scutes strong, anterior to the ventral there are 16, and 10 posterior to it. Gill-rakers—about 13 along the horizontal limb of the outer branchial arch: they are nearly as long as the eye. Pseudobranchiæ rudimentary. *Colours*—bronze along the back, which in the fresh state is divided by a silvery band from the purple and gold tinted abdomen. Black venules on the shoulder behind the upper half of the opercle. Fins yellow, dorsal sometimes edged with black.

Habitat.—Sind, through seas of India to the Malay Archipelago.

2. **Engraulis Malabaricus**, Plate CLVII, fig. 5.

Clupea Malabarica, Bloch, plate 432.
Clupea, Russell, Fish. Vizag. ii, p. 75, and *Poorwa*, fig. 194.
Engraulis Malabaricus, Cuv. and Val. xxi, p. 63, pl. 609; Bleeker, Beng. p. 74; Day, Fish. Malabar, p. 239; Günther, Catal. vii, p. 395.
Thryssa Cuvieri and *Malabaricus*, Swainson, Fishes, ii, p. 293.
Monangoo, Mal.: *Poor-relan*, Tam.

B. xii, D. 1 + 14-15($\frac{2-3}{12}$), P. 14, V. 7, A. 40-43($\frac{2-3}{38-40}$), C. 20, L. l. 39-40, L. tr. 11-12.

Length of head 5, of caudal $5\frac{1}{2}$, height of body $3\frac{3}{4}$ in the total length. *Eyes*—subcutaneous, diameter $4\frac{1}{3}$ in the length of head, 3/4 of a diameter from end of snout, and $1\frac{1}{2}$ apart. Snout slightly in advance of the lower jaw. Maxilla dilated above the mandibular joint, it extends posteriorly to the gill-opening. *Teeth*—fine ones in the jaws and on the palate. *Fins*—dorsal commences rather nearer to the snout than to the base of the caudal fin. Anal commences behind the vertical from the last dorsal ray. Pectoral reaches the base of the ventral. *Scales*—regularly arranged: 17 scutes before and 9 or 10 behind the base of the ventral fin. Gill-rakers about 1/2 the length of the eye, from 21 to 25 on the horizontal branch of the outer branchial arch. Pseudobranchiæ rudimentary. *Colours*—silvery shot with gold and purple: black venules on the shoulder, fins yellow: dorsal and end of caudal edged with dark. Pectoral sometimes, but not usually, black.

Habitat.—Coasts of Sind and through the seas of India.

3. **Engraulis mystax**, Plate CLVII, fig. 3.

Clupea mystax, Bloch, Schneider, p. 426, t. 83.
Thryssa mystax, Cuv. Règne Anim.; Richards. Ich. China, p. 309.
Engraulis mystax, Cuv. and Val. xxi, p. 67; Bleeker, Beng. p. 74, and Atl. Ich. vi, p. 132, t. 261, f. 2 (not Haring. p. 43); Cantor, Catal. Mal. Fish. p. 307.
Thryssa porava, Bleeker, Madura, p. 14.
Engraulis mystacoides, Bleeker, Haring. p. 42; Günther, Catal. vii, p. 396.
Engraulis Hamiltoni, Kner, Novara Fische, p. 334.
Stolephorus (Thyssa) mystax, Bleeker, Atl. Ich. vi, t. 261.

B. xii-xiv, D. 1 + 13-15($\frac{3}{10-12}$), P. 12, V. 7, A. 35-38($\frac{2-3}{33-35}$), C. 19, L. l. 45, L. tr. 12.

Length of head 5, of caudal $5\frac{1}{2}$, height of body $4\frac{1}{2}$ to $4\frac{3}{4}$ in the total length. *Eyes*—subcutaneous, diameter $4\frac{1}{2}$ in the length of head, 1 diameter from end of snout, and $1\frac{1}{4}$ apart. Snout projecting: the maxilla enlarged opposite the mandibular joint, it extends backwards to opposite the base of the pectoral fin. Opercle twice as high as wide. *Fins*—dorsal commences midway between the snout or anterior end of the orbit and the base of the caudal, which latter has the lower lobe usually the longer: anal commences just posterior to the last dorsal ray: pectoral extends to the last third of the small ventrals. *Scales*—nine strong scutes behind the ventral fin and 16 or 17 weaker ones before it. Gill-rakers as long as the eye, 13 on the horizontal limb of the outer branchial arch, 2/3 as long as the eye. Pseudobranchiæ rudimentary. *Colours*—black venules over the scapular region, the dorsal and caudal yellow, the latter having a black upper and posterior end, at least in the young.

Bleeker observes that *Engraulis Hamiltonii*, Cuv. and Val. xxi, p. 66=Bleeker, Haring, p. 43, and *E. Valenciennesi*, Atl. Ich. p. 133 and *Stolephorus (Thryssa) Valenciennesi*, Atl. Ich. t. 260, f. 6, is not this species: having a more squat body, L. l. 35-36, L. tr. 11-12.

Habitat.—Seas and estuaries of India to the Malay Archipelago and China.

4. Engraulis Kammalensis, Plate CLVII, fig. 1.

Bleeker, Ich. Madura, p. 13, and Atl. Ich. vi, p. 131.

Engraulis rhinorhynchus, Bleeker, Haring, p. 40, and Borneo, p. 434; Kner, Novara Fische, p. 334; Günther, Catal. vii, p. 394; Day, Proc. Zool. Soc. 1869, p. 384.

Stolephorus (Thryssa) Kammalensis, Bleeker, Atl. Ich. t. 265, f. 2.

B. x-xi, D. 1 + 13-14($\frac{3}{10\text{-}11}$) P. 12, V. 7, A. 34-38($\frac{3}{31\text{-}35}$), C. 19, L. l. 36-38, L. tr. 9-10.

Length of head $4\frac{1}{2}$, of caudal 5, height of body 4 in the total length. *Eyes*—subcutaneous, diameter 4 in the length of head, 1 diameter from the end of snout and also apart. Snout projecting beyond the lower jaw, which latter anteriorly reaches to below the front edge of the eye. Maxilla enlarged opposite the angle of the mouth, and extending posteriorly to opposite the gill-opening. *Teeth*—fine in jaws, vomer, and palate. *Fins*—dorsal commences rather nearer the base of the caudal than the end of the snout, or else midway between those points. Pectoral reaches to opposite the end of the small ventral, which is inserted rather in advance of the origin of the dorsal; anal commences a short distance behind the last dorsal ray. *Scales*—fourteen scutes before and eight behind the base of the ventral fin. *Gill-rakers*—twenty-two on the horizontal branch of the outer branchial arch. Pseudobranchiæ rudimentary. *Colours*—silvery, tinged with gold: the upper portion of the head, dorsal, and caudal fins yellowish, with numerous fine black dots. Dark venules on the shoulder extending indistinctly over the back.

Habitat.—Ceylon, Bay of Bengal to the Malay Archipelago, attaining about six inches in length. The example figured (life size) was from Orissa.

5. Engraulis boelama, Plate CLVIII, fig. 7.

Clupea boelama, Forsk. Descr. Anim. p. 72; Bl. Schn. p. 429.

Engraulis nesogallicus, Bennett, Proc. Zool. Soc. i, 1831, p. 168.

Engraulis boelama, Cuv. and Val. xxi, p. 35; Günther, Catal. vii, p. 393, Fish. Zanz. p. 123, Proc. Zool. Soc. 1871, p. 671; Bleeker, Atl. Ich. vi, p. 130; Klunz. Verh. z. b. Ges. Wien. 1871, p. 597.

Stolephorus boelama, Bleeker, Amb. p. 291, and Atl. Ich. vi, t. 260, f. 1.

B. xi, D. 14-16($\frac{2\text{-}3}{12\text{-}13}$), P. 13, V. 7, A. 29-32($\frac{2\text{-}3}{27\text{-}29}$), C. 20, L. l. 41, L. tr. 8.

Length of head $4\frac{1}{2}$, of caudal $5\frac{1}{2}$, height of body 5 in the total length. *Eyes*—subcutaneous, diameter 1/4 of length of head, nearly 1 diameter from the end of snout, and 1 apart. Greatest height of the head equals its length excluding the snout. Snout compressed, pointed, and projecting considerably beyond the end of the jaws. Maxilla obliquely truncated posteriorly and reaching slightly beyond the mandibular joint. *Teeth*—small, equal in both jaws: a small patch on vomer: a single band on palate. *Fins*—origin of dorsal nearer the end of the snout than the base of the caudal: anal commences a short distance behind the last dorsal ray. Pectoral nearly reaches the ventral, which is inserted below the anterior dorsal rays. *Scales*—regularly arranged, scutes very indistinct, not extending above 1/2 way between base of the pectoral and ventral fins, 4 or 5 being before and 8 or 9 behind the base of that fin. Gill-rakers fine, closely set, about 21 or 22 on the outer branch of the lower branchial arch, they are nearly as long as the eye. *Colours*—bluish above, becoming silvery on the sides and beneath: head glossed with gold.

It is observed in Cuv. and Val. that its flesh is poisonous (not only to men but to the lower animals), if prepared previous to removing the head and intestines.

Habitat.—From the Red sea and coast of Zanzibar through the seas of India to the Andamans, also recorded by Günther from Mysol and Manado. The example, figured life-size, was from Port Blair.

6. Engraulis setirostris.

Clupea setirostris, Brouss. Ich. Dec. i, tab.; Bonn. Ich. p. 186, t. 76, f. 316; Gmel. Linn. p. 1407; Bl. Schn. p. 428; Russell, Fish, Vizag. ii, p. 80, and *Yeka-poorawah*, fig. 201; Lacépède, Poissons, v, p. 425 (part).

Thryssa setirostris, Cuvier, Règn. Anim.

Clupea mystacina, Forst. Desc. Anim. Ed. Licht. p. 295.

Engraulis setirostris, Cuv. and Val. xxi, p. 69; Bleeker, Beng. p. 74, Haring. p. 44, and Atl. Ich. vi, p. 134; Günther, Catal. vii, p. 397.

Thryssa macrognathus, Bleeker, Madura, p. 14.

Stolephorus setirostris, Bleeker, Amb. p. 291, and Atl. Ich. t. 261, f. 1.

B. x-xi, D. 1 + 14-16($\frac{3}{11-13}$), P. 14, V. 6, A. 34-38($\frac{3}{31-35}$), C. 17, L. l. 36-44, L. tr. 11.

Length of head $5\frac{3}{4}$ to $6\frac{1}{2}$, of caudal 5, height of body $4\frac{1}{4}$ to 5 in the total length. *Eyes*—diameter $3\frac{1}{2}$ to 4 in length of head, 1/2 a diameter from end of snout, and 1 apart. Snout hardly projecting. The angle of the mouth is beneath the hind edge of the eye. The maxillary very prolonged, extending to the posterior end of the ventral fin or even beyond. *Teeth*—fine in jaws, present also on tongue, vomer, palatines and pterygoids. *Fins*—origin of dorsal midway between end of snout and base of caudal fin: the anal commences just posterior to the last dorsal ray. Abdominal edge spinate: 17 spines before and 9 behind the insertion of the ventral fin. Gill-rakers 10 on the horizontal limb of the outer branchial arch. *Colours*—greenish along the back, becoming silvery on the sides and beneath. Black venules in the region of the scapula.

Habitat.—From the Red Sea through the seas of India to the Malay Archipelago.

7. Engraulis Dussumieri, Plate CLVIII, fig. 4.

Cuv. and Val. xxi, p. 69; Bleeker, Haring. p. 43, Atl. Ich. vi, p. 133, and *Stolephorus Dussumieri*, t. 260, f. 2; Kner, Novara Fische, p. 333.

Engraulis Hamiltoni, Cuv. and Val. xxi, p. 66 (not Gray and Hardwicke).

Engraulis auratus, Day, Fish. Malabar, p. 238, pl. xix, f. 2.

Engraulis mystax, Günther, Catal. vii, p. 397 (not Bl. Schn.)

B. xii, D. 1 + 13-15($\frac{2-3}{11-12}$), P. 12, V. 7, A. 34-36($\frac{3}{31-33}$), C. 17, L. l. 40-42, L. tr. 9-10.

Length of head $4\frac{1}{2}$ to $4\frac{2}{3}$, of caudal 5 to $5\frac{1}{2}$, height of body $4\frac{1}{4}$ to $4\frac{1}{2}$ in the total length. *Eyes*—subcutaneous, diameter 4 in the length of the head, 2/3 of a diameter from the end of snout and 1 apart. The snout projects considerably over the mouth: the angle of the mouth is far behind the posterior margin of the orbit. The maxilla dilated opposite the mandibular joint, elongated posteriorly and almost or quite reaching the ventral fin. *Teeth*—fine ones in the jaws. *Fins*—dorsal commences rather nearer snout than the base of caudal fin, it is situated entirely in advance of anal, which commences a short way behind it. Pectoral as long as head without the snout. Ventral inserted slightly in advance of the vertical from the origin of the dorsal. Caudal forked, lower lobe the longer. 7 to 8 strong spines behind the ventral fin and 13 to 14 anterior to it. Pseudobranchiæ rudimentary. *Colours*—coppery, becoming silvery below, a large black shoulder spot passing over the back: caudal straw-coloured with a dark extremity.

Habitat.—Seas of India to the Malay Archipelago. The example figured (life-size) was from Madras.

b. Dorsal fin partly or entirely above the anal.

8. Engraulis telara, Plate CLVIII, fig. 2.

Clupea telara and *phasa*, Ham. Buch. Fish. Ganges, pp. 240, 241, 382, pl. 2, f. 72.

Engraulis brevifilis, *telara* and *phasa*, Cuv. and Val. xxi, pp. 54, 56, 59, pl. 608: Bleeker, Beng. en Hind. pp. 74, 147.

Setipinna truncata and *megalura*, Swainson, Fishes, ii, p. 292.

Engraulis telara, Günther, Catal. vii, p. 401.

B. xii-xiii, D. 1 + 14-15($\frac{2-3}{12}$), P. 15, V. 7, A. 70-80($\frac{2}{68-78}$), C. 19, L. l. 52, L. tr. 14.

Length of head 6 to 7, of caudal 6 to $6\frac{1}{2}$, height of body $4\frac{1}{2}$ in the total length. *Eyes*—subcutaneous, diameter $4\frac{1}{2}$ in the length of head, 3/4 of a diameter from end of snout and $1\frac{1}{3}$ apart. Abdominal profile more prominent than the dorsal, snout slightly overhanging the mouth: the maxilla extends to opposite the gill-opening, it is enlarged above the mandibulary joint, from whence it is cut straight to its pointed extremity. Opercle twice as high as wide. *Teeth*—fine in both jaws, rather larger in the palate: and some fine ones on the vomer. *Fins*—origin of dorsal slightly posterior to that of the anal, much nearer snout than the base of the caudal fin. Pectoral with its superior ray elongated to opposite the centre of anal fin (in some examples this ray is only slightly produced), whilst the fin itself extends as far as to opposite the posterior end of the ventral: lower caudal lobe the longer, the upper being truncated; the length of the base of the anal fin is considerably more than 1/2 the distance from the end of the snout to the caudal fin. *Scales*—very deciduous, some over the base of the anal and dorsal fins: seven spinate scales behind the ventral and 15 or 16 anterior to it. Pseudobranchiæ rudimentary. Gill-rakers rather longer than the eye. *Colours*—greenish along back, becoming silvery dashed with gold along the abdomen, dorsal and caudal yellow, with the upper lobe of the caudal and the upper margin of the dorsal stained with black: pectoral in the young yellowish, but in the adult of a deep blue-black except the elongated ray which is usually uncoloured in its posterior three-fourths: ventral and anal also uncoloured.

Habitat.—Orissa, Bengal, Cachar and Burma, in which latter country I have taken is as high up as Mandalay. It attains at least 16 inches in length. The example figured (life-size) was from Calcutta.

9. Engraulis breviceps.

Cantor, Catal. Mal. Fish. p. 306; Günther, Catal. vii, p. 401.
Engraulis Pfeifferi, Bleeker, Borneo, p. 433.
Setipinna breviceps, Bleeker, Atl. Ich. vi, p. 157.
Stolephorus (Setipinna) Pfeifferi, Bleeker, l. c. t. 263, f. 3.

B. xvi-xix, D. 1 + 17($\frac{3}{14}$), P. 14, V. 7, A. 60-64($\frac{3}{57-61}$), C. 17, L. l. 54-56, L. tr. 14.

Length of head 7 to $7\frac{2}{5}$, of caudal fin 5 to 6. height of body 4 to $4\frac{1}{2}$ in the total length. *Eyes*—diameter $5\frac{1}{2}$ to 6 in the length of the head, 3/4 of a diameter from end of snout, and 1 to $1\frac{1}{2}$ apart. Lower jaw slightly the longer: maxilla truncated opposite the mandibular joint. Opercle high and narrow. *Teeth*—small ones in the jaws, tongue, and palate. *Fins*—dorsal commences about midway between the snout and base of the caudal fin. Pectoral with its upper ray prolonged. Anal commences somewhat in advance of the dorsal, the length of its base being equal to half the total length excluding the caudal fin. *Scales*—the whole of the abdominal edge serrated. Gill-rakers widely set and longer than the eye: 11 on the lower branch of the outer branchial arch. *Colours*—greenish-yellow on the back, becoming silvery on the sides and beneath: the body with some dark blotches in its upper half. Fins yellow, the dorsal, caudal, and last half of the anal having dark margins.

Habitat.—Bay of Bengal to the Malay Archipelago.

10. Engraulis taty, Plate CLVIII, fig. 5.

Cuv. and Val. xxi, p. 60; Cantor, Catal. p. 306; Bleeker, Haring. p. 35 and Beng. p. 74; Day, Fish. Malabar, p. 240: Günther, Catal. vii, p. 400.
Engraulis tenuifilis, Cuv. and Val. xxi, p. 62.
Engraulis telaroides, Bleeker, Madura. p. 13.
Setipinna taty, Bleeker, Atl. Ich. vi, p. 136.
Stolephorus taty, Bleeker, Atl. Ich. vi, t. 260, f. 7.

B. xi-xii, D. 1 + 13-15($\frac{3}{10-12}$), P. 15, V. 7, A. 51-57($\frac{3}{48-54}$), C. 19, L. l. 42-46, L. tr. 12.

Length of head 6 to $6\frac{1}{2}$ ($5\frac{1}{2}$ in the very young), of caudal $5\frac{1}{4}$, height of body $3\frac{3}{4}$ to 4 in the total length. *Eyes*—subcutaneous, diameter 4 in the length of head, 1/2 to 2/3 of a diameter from the end of snout, and $1\frac{1}{2}$ apart. Snout projecting over the lower jaw: the maxilla extends backwards beyond the mandibular joint where it is dilated, posteriorly it is truncated. *Teeth*—fine in the jaws, a few villiform ones on the vomer, and numerous on the palatines and pterygoids. *Fins*—dorsal arises nearer the snout or midway between it and the root of the caudal, the anal is nearly half as long as the total length excluding the caudal fin, it begins below the middle of the dorsal: first pectoral ray having (but not invariably) a long filamentous ending: caudal lobed, the lower the longer. *Scales*—twelve scutes posterior to the base of the ventral fin and about 23 anterior to it. Gill-rakers lanceolate and rather widely set. *Colours*—upper surface of head and back green, or greenish-yellow, sparingly dotted with black: sides, abdomen, cheeks, and opercles silvery: dorsal, caudal, and anal yellow, some black dots on dorsal: ventrals and pectorals yellowish, the latter sometimes dark: the edges and posterior margins of the caudal blackish. Iris silvery, supraorbital half bluish-black.

I have seen an example from Bombay with some black blotches on it.

Habitat.—Seas and estuaries of India and the Malay Archipelago. It attains at least six inches in length and is eaten either fresh or salted. The example figured (life-size) was from Orissa.

11. Engraulis purava, Plate CLVII, fig. 2.

Clupea, Russell, Fish. Vizag. ii, p. 73, and *Peddah-poorawah*, pl. 190.
Clupea purava, Ham. Buch. Fish. Ganges, pp. 238, 382.
Engraulis purava, Cuv. and Val. xxi, p. 65; Cant. Mal. Fish. p. 308; Bleeker, Beng. p. 74, and Atl. Ich. vi, p. 135; Günther, Catal. vii, p. 397.
Thryssa megastoma, Swainson, Fishes, ii, p. 293.
Pussai and *Tampura*, Ooriah.

B. xii, D. 1 + 13($\frac{3}{10}$), P. 15, V. 6, A. 45-47($\frac{2}{43-45}$), L. l. 46, L. tr. 12.

Length of head $5\frac{3}{4}$ to 6, of caudal $5\frac{3}{4}$ to 6, height of body $4\frac{1}{4}$ to $4\frac{1}{2}$ in the total length. *Eyes*—subcutaneous, diameter $4\frac{1}{2}$ to 5 in the length of the head, 3/4 of a diameter from end of snout and 1 apart. Snout slightly elevated and rather projecting (in adults) beyond the extremity of the lower jaw. Smooth portion of the opercle rather above twice as high as wide, and oblique in its direction. The maxilla rather dilated opposite the mandibular joint and gradually decreasing in width, it reaches nearly to the base of the pectoral fin. *Teeth*—fine ones in both jaws. *Fins*—the dorsal commences midway between the snout and the base of the caudal fin, or rather nearer the latter in some examples. Pectoral reaches the ventral which does not extend half way to the base of the anal. Anal commences beneath the posterior dorsal rays. Caudal forked. *Scales*—in regular horizontal lines, with a fine row at the base of the dorsal and anal fins: there are 15 or 16 spinate scales between the throat and the base of the ventral fin, and 10 or 11 between the ventral and the base of the anal. *Colours*—silvery, steel-blue along the back and a golden tinge about the head: dorsal and caudal fins

yellowish, the others uncoloured. *Gill-rakers*—lanceolate, rather widely set, and the largest are about as long as the eye.

Habitat.—Seas and estuaries of Sind, both sides of India, also the Malay Archipelago. It attains at least 12 inches in length.

12. Engraulis Commersonianus, Plate CLVIII, fig. 1.

Stolephorus Commersonianus, Lacépède, Poissons, v, p. 382, t. xii, f. 1; Bleeker, Atl. Ich. vi, p. 128, t. 259, f. 1.
Clupea vittargentea, Lacépède, Poissons, v, p. 458.
Atherina Commersoniana, Shaw, Zool. i, t. 113, f. 1 (from Lacépède).
Atherina Australis, White, Voy. N. S. Wales, p. 296.
Engraulis Commersonii, Cuvier, Règ. Anim.: Bleeker, Java, p. 11.
Engraulis Brownii, Cuv. and Val. xxi, p. 41 (part); Bleeker, Beng. p. 74, and Haring. p. 39; Kner, Novara Fische, p. 332.
Stolephorus Brownii, Bleeker, Amboina, p. 291.
Engraulis Commersonianus, Günther, Catal. vii, p. 388.

B. xi-xiii, D. 14-16$(\frac{2}{12-14})$, P. 15-16, V. 7, A. 19-21$(\frac{2}{17-19})$, C. 19, L. l. 38-40, L. tr. 8-9, Cæc. pyl. 16.

Length of head 5 to $5\frac{1}{4}$, of caudal $5\frac{1}{4}$ to $5\frac{1}{2}$, height of body $5\frac{1}{4}$ to $5\frac{3}{4}$ in the total length. *Eyes*—subcutaneous, $3\frac{1}{2}$ diameters in the length of the head, 1/2 to 2/3 of a diameter from end of snout, and nearly 1 apart. Snout pointed, projecting considerably beyond, and overhanging the mouth. The maxilla moderately dilated opposite the mandibular joint and continued to the gill-opening. Height of the head 1/4 less than its length. *Teeth*—fine ones in the jaws, vomer, and palate. *Fins*—dorsal commences nearer the base of the caudal than to the front end of the snout, and posterior to the insertion of the ventral: the anal commences below the middle of the dorsal. *Scales*—very deciduous. Pseudobranchiæ well-developed. *Colours*—silvery, greenish above, opercles shining silvery shot with gold. A large black spot, sometimes indistinct, just behind the occiput. A broad silvery band passes from the centre of the posterior margin of the opercle to the centre of the caudal, becoming widest posteriorly. Abdomen light buff-colour. Fins yellowish, with minute black dots. Eyes silvery, orbital margin dark. Caudal shot with bluish.

Habitat.—Seas of India to the Malay Archipelago. It attains to about 8 inches in length, and is much esteemed for eating. It is known as *whitebait* amongst Europeans, and is captured in India in great numbers. In the Straits *Cantor* states that large quantities of them are preserved for exportation to China and India, as well as for home consumption, forming a delicious condiment known under the designation of "*Red-fish.*" The following is the mode of preparation:—"After the heads have been removed, the fishes, (those of middling size are preferred) are cleansed, salted (in the proportion of one to eight parts of fish) and deposited in flat glazed earthen vessels. In the latter they are for three days submitted to pressure, by means of stones placed on thin boards or dried plantain leaves. The fishes are next freed from salt, and saturated with vinegar and cocoa-palm toddy, after which are added powdered ginger and black pepper (the latter mostly entire), and some brandy and powdered "red rice." After having been kept for three days, a little more vinegar is added before placing the fishes in well closed jars or bottles. They should be kept four or five months before being used."—*Cantor*, p. 305. "*Red rice* is a variety of *Oryza sativa* called *glutinosa*, steeped in an infusion of cochineal."

13. Engraulis Indicus, Plate CLVIII, fig. 3.

Clupea atherinoides, Russell, Fish. Vizag. ii, p. 71, and *Nattoo*, pl. 187 (not Linn.)
Engraulis Indicus, v. Hasselt, Algem. Konst.-Letterb. 1823, p. 329.
Engraulis albus, Swainson, Fishes, ii, p. 293; Jerdon, M. J. L. and Sc. 1851, p. 145.
Engraulis Brownii, Cantor, Catal. p. 303; Day, Fish. Malabar, p. 237; Günther, Fish. Zanz. p. 123.
Engraulis Balinensis, Bleeker, Verh. Bat. Gen. xxii, Bali, p. 11.
Engraulis Russellii, Bleeker, Beng. p. 74, and Haring. p. 38; Günther, Catal. vii, p. 390.
Stolephorus Russellii, Bleeker, Ternate, p. 236.
Stolephorus Indicus, Bleeker, Atl. Ich. vi, p, 127, t. 259, f. 2.
Nattoo, Tel.: *Nettellee*, Tam.: *Zoo-roo-cart-dah*, Andam.

B. xi-xiii, D. 15-16$(\frac{3}{12-13})$, P. 15, V. 7, A. 19$(\frac{3}{16})$, C. 19, L. l. 40, L. tr. 8-9.

Length of head $4\frac{2}{3}$ to 5, of caudal $5\frac{3}{4}$ to 6, height of body 6 to $6\frac{1}{2}$ in the total length. *Eyes*—subcutaneous, diameter $3\frac{1}{2}$ in the length of the head, 2/3 to 3/4 of a diameter from end of snout, and 1 apart. Body moderately compressed, the dorsal and abdominal profiles, equally and slightly convex. The greatest height of the head equals its length excluding the snout. Snout pointed and projecting considerably beyond the jaws. Maxilla enlarged and truncated opposite the mandibular joint. *Teeth*—small in the jaws, tongue, and palate. *Fins*—dorsal commences nearer the base of the caudal fin than to the end of the snout, its first half in advance of the origin of the anal. *Scales*—very deciduous; 4 scutes before the base of the ventral fin. Pseudobranchiæ present. Gill-rakers closely set, not so long as the eye. *Colours*—silvery, dashed with green along the back, and sometimes some dark spots behind the occiput. A brilliant silvery band passes from opposite the upper edge of the eye to the middle of the caudal fin.

Habitat.—Seas of India to the Malay Archipelago. It ascends tidal rivers.

14. Engraulis tri, Plate CLVIII, fig. 6.

Bleeker, Haring. p. 40 and Borneo, p. 455; Günther, Catal. vii, p. 389.
Stolephorus tri, Bleeker, Atl. Ich. vi, p. 128, t. 262, f. 1.

B. xi, D. 1 + 14-15($\frac{2}{12\text{-}13}$), P. 13, V. 7, A. 20-22($\frac{3}{17\text{-}19}$), C. 17, L. l. 38, L. tr. 8.

Length of head 5 to $5\frac{1}{4}$, of caudal $5\frac{1}{4}$, height of body 5 to $5\frac{1}{4}$ in the total length. *Eyes*—subcutaneous, diameter $3\frac{1}{2}$ in the length of the head, 1/2 to 3/4 of a diameter from the end of snout and 1 apart. Body compressed, the abdominal profile more convex than the dorsal. The greatest height of the head equals its length excluding the snout. Snout pointed and projecting considerably beyond the jaws. Maxilla enlarged opposite the mandibular joint, pointed posteriorly and reaching to the gill-opening. *Teeth*—present on jaws, vomer, palatines, and pterygoids. *Fins*—dorsal commences between the front edge of the eye and the base of the caudal fin. Ventral inserted on a line anterior to the origin of the dorsal. Anal commences under the middle of the dorsal. *Scales*—regularly arranged and not very deciduous. Scutes, 4 long slender ones before the ventral fin. Gill-rakers, the longest not quite so long as the eye, about 25 in the horizontal branch of the outer branchial arch. *Colours*—silvery shot with purple: a silvery band passes from opposite the eye to the base of the caudal fin: a dark spot behind occiput.

Bleeker observes that this species has 32 to 35 scales along the lateral-line.

Habitat.—From Bombay through the seas and estuaries of India to the Malay Archipelago. It ascends the Hooghly as high as Calcutta. It attains about 4 inches in length.

Genus, 2—Coilia, *Gray*.

Mystus, Lacép.; *Trichosoma*, Swains.; *Chætomus*, McLelland; *Collia*, Schleg.; *Leptonurus*, Bleeker.

Branchiostegals nine to eleven. Body elongated, compressed and tapering to a pointed tail: abdomen trenchant and serrated. Snout pointed and projecting. Mouth cleft to behind the eye: the maxilla produced posteriorly. Teeth on the jaws, vomer, palatine, and pterygoid bones, also on the tongue. A single rather short dorsal fin placed in the anterior portion of the back: anal elongated and confluent with the caudal: some of the upper pectoral rays produced into moderately thick filaments. Scales of moderate or small size.

In an example of a species *(C. Dussumieri)* of this genus captured in Orissa, a portion of the tail has been lost and a new caudal fin has sprung from the excised end: it is nearly twice as long as seen in normal examples.

A.—The maxilla does not extend posteriorly beyond the head.

1. *Coilia Reynaldi*, P. 5-6 + xii, A. 116, L. l. 55. Pectoral fin short: free rays long: some spines before ventral fin: no spots on body. Bengal.
2. *Coilia ramcarati*, P. 6 + vi, A. 95-110, L. l. 70. Pectoral fin short: free rays long: five spines before ventral fin: no spots on body. Bengal.
3. *Coilia Cantoris*, P. 6 + vi, A. 75, L. l. 58. Pectoral fin short: free rays long: five spines before ventral fin: no spots on body. Bengal.
4. *Coilia quadragesimalis*, P. 6 + vi, A. 42. Pectoral fin short: free rays long: no spots on body. Bengal.

B.—The maxilla does extend posteriorly beyond the head.

5. *Coilia Dussumieri*, P. 9 + v-vi, A. 105. Pectoral fin nearly as long as head: upper rays long: five or six spines before ventral fin: two or three rows of round yellow spots. India to the Malay Archipelago.
6. *Coilia Borneensis*, P. 6 + ix-xii, A. 77-95. Pectoral fin short: free rays long: five spines before ventral fin: no spots. Seas and estuaries of India to the Malay Archipelago.

1. Coilia Reynaldi.

Coilia Reynaldi, Cuv. and Val. xxi, p. 81; Bleeker, Beng. p. 74, and Atl. Ich. vi, p. 141, t. 266, f. 1.

B. ix, D 1 + 14($\frac{3}{11}$), P. 5-6 + 12, V. 6, A. 116, C. 10, L. l. 55, L. tr. 10-11.

Length of head 7, of caudal fin $9\frac{1}{2}$, height of body 6 in the total length. *Eyes*—diameter 1/4 of length of head, 1 diameter from end of snout, and $1\frac{1}{2}$ apart. The distance from the end of the snout to the anal fin is less than 1/3 of the total length: the maxilla extends nearly to the end of the opercles, close to the origin of the pectoral fin. Snout overhanging the upper jaw, which last is longer than the mandibles. *Teeth*—fine in both jaws. *Fins*—the dorsal commences in the first fourth of the total length: the anal under or slightly beyond the posterior margin of the dorsal. Dorsal with a spine a very little distance anterior to the fin. Pectoral short, with the upper rays prolonged nearly to the middle of the body. Anal longer than in *C. ramcarati*, continuous with the caudal. *Scales*—twelve sharp spines exist along the abdominal edge, which is serrated in front of the ventrals. *Colours*—silvery-white, with pinkish reflections.

Habitat.—The Hooghly at Calcutta.

2. Coilia ramcarati, Plate CLIX, fig. 2.

Mystus ramcarati, Ham. Buchanan, Fish. Ganges, pp. 233; Gray, Zool. Mis. p. 9; McClelland, Calc. Journ. Nat. Hist. iv, p. 406.
Engraulis (coilia) Hamiltonii, Gray and Hard. Ill. Ind. Zool. (from H.B.'s MSS.)
Ramcarati coilia, Gray, Zool. Mis. p. 9.
Coilia Hamiltoni, Gray, l. c.; Cuv. and Val. xxi, p. 79; Bleeker, Beng. p. 74.
Chætomus Hamiltonii, McClelland, Calcutta J. N. History, iv, p. 406.
Trichosoma Hamiltonii, Swainson, Fishes, ii, p. 292.
Coilia ramcarati, Günther, Catal. vii, p. 402.

B. xi, D. 1 + 14($\frac{2}{12}$), P. 6 + vi, V. 12, A. 95-110, L. l. 70, L. tr. 9-10.

Length of head 6, of caudal 10 to 11, height of body $5\frac{1}{4}$ in the total length. *Eyes*—subcutaneous, diameter 5 in the length of the head, 3/4 of a diameter from the end of snout, and $1\frac{1}{2}$ apart. Maxilla dilated above the mandibular joint, behind which it is truncated. Snout somewhat projecting beyond the mouth. The distance between the snout and dorsal fin is 1/4 of the total length. *Teeth*—fine and rather widely set in jaws, also on palate. *Fins*—the six lower pectoral rays are very short and almost concealed in a scaly sheath, the free ones reach to about the middle of the length of the fish. Ventral as long as the postorbital length of the head and inserted slightly before the front edge of the dorsal. The length of the base of the anal is about 1/3 of the distance between the gill-opening and base of the caudal fin, the upper ray of the latter fin being the longest. *Scales*—five spinate ones anterior, and 10 or 11 posterior to the base of the ventral fin. Gill-rakers rather fine and closely set, about 28 in the horizontal branch of the outer branchial arch. Pseudobranchiæ present. *Colours*—generally golden, with a darkish stain behind the gill-opening: the last half of the anal and the whole of the caudal blackish: no golden spots on the body.

In the Catalogue of Fishes of British Museum it is erroneously observed that the abdomen is not serrated in front of the *ventral* fin, it should be *pectoral* as I have convinced myself by examining the specimens in the British Museum. This is also shown in H. Buchanan's figure, of which a copy exists in Gray and Hardwicke, l. c.

Habitat.—Rivers and estuaries of Bengal.

3. Coilia Cantoris.

Bleeker, Beng. pp. 74 and 148.

B. ix, D. 1 + 13($\frac{3}{10}$), P. 6 + vi, V. 7, A. 75, C. 10, L. l. 58.

Length of head 6, of caudal fin $8\frac{1}{4}$, height of body $6\frac{1}{3}$ in the total length. Snout pointed and projecting beyond the mouth. *Eyes*—diameter $4\frac{1}{2}$ in the length of the head, 2/3 of a diameter from the end of snout. The maxilla obliquely truncated and not extending to the branchial aperture. *Teeth*—in jaws, small and equal. *Fins*—dorsal commencing in the second fourth of the length of the body. Pectoral rays short, the free ones not reaching so far as to the anal fin: ventral not half so long as the head. Length of the base of the anal rather above 1/2 that of the total length. *Scales*—five spines on the abdominal edge before the ventral fin and 10 behind it. *Colours*—without marks.

Habitat.—One young example nearly 4 inches long was captured in the Hooghly. The above description is from the type.

4. Coilia quadragesimalis.

Cuvier and Val. xxi, p. 83; Bleeker, Bengal, p. 74; Günther, Catal. vii, p. 404.

B. x, D. 15, P. 6 + vi, V. 8, A. 42, C. 25.

Height of body $4\frac{3}{4}$ in the total length. *Eye*—small. Mouth obtuse: the maxilla truncated and does not extend posteriorly behind the angle of the jaw. *Teeth*—small, those on the vomer very distinct. *Fins*—dorsal inserted at the posterior end of the first third of the length of the body. Pectoral short, its 6 free rays equal 1/2 the total length. The anal commences a little before the middle of the total length. *Colours*—silvery shot with gold and having nacreous reflections: fins yellowish.

Habitat.—One example 6 (French) inches long, from the Ganges.

5. Coilia Dussumieri, Plate CLVIII, fig. 8.

Cuv. and Val. xxi, p. 81, pl. 610; Bleeker, Beng. p. 74; Day, Fish. Malabar, p. 242.
Leptonurus chrysostigma, Bleeker, Madura, p. 14.
Oorialli, Ooriah.

B. xi, D. 1 + 13-14($\frac{3}{10-11}$), P. 9 + v-vi, V. 7, A. 105($\frac{3}{102}$), C. 12, L. l. 80, L. tr. 9.

Length of head 6 to $6\frac{1}{3}$, of caudal 11, height of body $5\frac{1}{3}$ in the total length. *Eyes*—subcutaneous, diameter 4 to $4\frac{1}{4}$ in the length of the head, 3/4 of a diameter from the end of snout and $1\frac{1}{4}$ apart. Maxilla dilated opposite the mandibular joint and extending posteriorly to the gill-opening. Snout projecting beyond

the mouth. The distance between the snout and the first dorsal ray is 1/4 of the total length. *Teeth*—fine ones in jaws and palate. *Fins*—six upper pectoral rays produced to about the middle of the length of the fish, the longest of the lower rays equalling the head excluding the snout: ventral not 1/2 as long as the head, it is inserted below the middle of the dorsal fin. The length of the base of the anal is nearly equal to 3/4 of the distance between the gill-opening and the base of the caudal fin, the upper ray of which last is the longest, they decrease in length to the most inferior one. *Scales*—five or six spinate ones anterior to the ventral fin, and eight posterior to it, they commence just behind the insertion of the pectoral fin. *Gill-rakers*—rather fine, closely set, from 21 to 25 in the lower branch of the outer branchial arch, the longest being as long as the eye. Pseudobranchiæ absent. *Colours*—golden, with two or three rows of round burnished golden spots along the lower half of the side.

Coilia quadrifilis, Günther, Catal. vii, p. 403, appears to be a a variety having only 4 free filaments to the pectoral fin.

The variety figured by Bleeker has a much higher body than the typical form: it is also found in Bombay.

Habitat.—Very numerous at Bombay, seas and estuaries of India to the Malay Archipelago. It attains at least 7 inches in length. The example figured (life-size) was from Orissa where it is common.

6. Coilia Borneensis, Plate CLIX, fig. 1.

Bleeker, Haring. p. 45, Borneo, p. 437 and Atl. Ich. vi, p. 130, t. 262, fig. 3; Günther, Catal. vii, p. 403.

B. x, D. $1 + 14(\frac{2}{12})$, P. 6 + ix-xii, V. 7, A. 77 to 95, L. l. 76, L. tr. 9.

Length of head $5\frac{1}{2}$ to $6\frac{1}{2}$, of caudal 5 to 7, height of body 5 to $5\frac{1}{2}$ in the total length. *Eyes*—diameter 5 to $5\frac{1}{2}$ in the length of the head, 1 diameter from the end of snout and $1\frac{1}{4}$ apart. Maxilla dilated above the mandibular joint and continued backwards as far as the gill-opening. The distance between the snout and the dorsal fin is 1/4 of the total length. *Teeth*—generic. *Fins*—the six lower pectoral rays short: the 12 upper ones extend almost to the middle of the length of the body of the fish. Ventrals about 1/2 as long as the head. The length of the base of the anal equals 2/5 of the distance between the snout and the base of the caudal fin. *Scales*—four or five fine spines along the abdominal edge between the bases of the pectoral and the ventral fins: 5 behind the latter. *Colours*—golden, fins yellowish without any black marks.

Habitat.—Madras, Burma where it is common in the Irrawaddy river, also the Malay Archipelago.

Second group—CHATOESSIFORMES.

Mouth transverse, narrow, nearly or quite inferior, with the upper jaw projecting over the lower. Eyes with free adipose lids. Abdomen serrated.

Genus 3—CHATOESSUS, *Cuvier* and *Valenciennes.*

Dorosoma, Rafinesque; *Gonostoma*, v. Hasselt; *Anodontostoma*, Bleeker.

Branchiostegals from four to six. Body oval, short, deep, and moderately compressed: with a sharp, serrated abdominal edge. Snout overhanging a rather narrow transverse mouth. The superior combs of the first branchial arch unite with those of the opposite side, forming two angles, one pointing forwards, the other backwards: the fourth branchial arch having an accessory respiratory organ. Teeth absent from jaws. A single dorsal fin, having the last ray prolonged in some species; ventrals anterior to or below the dorsal fin; anal commencing posterior to the dorsal and with a moderate number of, or many rays; caudal forked. Air-vessel large, rounded anteriorly, pointed posteriorly. Cœcal pylori numerous. Pseudobranchiæ well developed.

SYNOPSIS OF SPECIES.

A.—*Last dorsal ray not prolonged.*

1. *Chatoessus chacunda*, D. 17-19, A. 19-20, L. l. 40-42, L. tr. 13-14. India to the Malay Archipelago.
2. *Chatoessus modestus*, D. 14-16, A. 27-28, L. l. 47, L. tr. 17. Burma.
3. *Chatoessus manminna*, D. 14-15, A. 22-24, L. l. 58-63, L. tr. 22-24. Fresh waters of India except its southern portion and the Deccan.

B.—*Last dorsal ray prolonged.*

4. *Chateossus nasus*, D. 15-17, A. 22-24, L. l. 46-50, L. tr. 18-19. Seas of India to the Malay Archipelago and beyond.

A.—*Last dorsal ray not prolonged.*

1. Chatoessus chacunda, Plate CLX, fig. 3.

Clupanodon chacunda, Ham. Buch. Fish. Ganges, pp. 246, 383.
Gonostoma Javanicum, Kuhl. and v. Hasselt, Alg. Konst. Letterb. 1823, p. 329.
? Clupea Mauritiana, Bennett, Proc. Zool. Soc. 1833, p. 32.

Anodontostoma Hasseltii, Bleeker, Madura, p. 15.
Chatoëssus chacunda, Cuv. and Val. xxi, p. 3; Cantor, Catal. p. 311; Bleeker, Beng. p. 74 and Haring. p. 46; Jerdon, M. J. L. and Sc. 1851, p. 146; Kner, Novara Fische, p. 337; Day, Fishes of Malabar, p. 242; Günther, Catal. vii, p. 411.
? *Chatoëssus tampo*, Cuv. and Val. xxi, p. 117.
Chatoëssus selanghat, Bleeker, l. c. p. 47, and Nat. Tyds. Ned. Ind. iii, p. 458 (variety).
Dorosoma chacunda, Bleeker, Atl. Ich. vi, p. 143, t. 261, fig. 5 and 6.
Muddeeru, Tel.; *Kore-paig-dah*, And.

B. vi, D. 17-19($\frac{3-4}{14-15}$), P. 15, V. 8, A. 19-20($\frac{2}{17-18}$), C. 19, L. l. 40-42, L. tr. 13-14.

Length of head $4\frac{1}{2}$ to 5, of caudal $4\frac{1}{2}$ to $4\frac{3}{4}$, height of body $2\frac{1}{2}$ to $2\frac{2}{3}$ in the total length. *Eyes*—diameter $3\frac{1}{2}$ to $3\frac{3}{4}$ in the length of the head, 2/3 of a diameter from the end of snout, and 1 apart. Head as high as long. Snout projecting considerably beyond the gape of the transverse mouth. Opercle rather more than twice as high as wide. *Fins*—origin of dorsal nearer the snout than the base of the caudal fin, no elongated ray. Pectoral as long as the head excluding the snout. Caudal forked. Ventral inserted below the middle of the dorsal fin. *Scales*—with smooth edges, regularly arranged; 28 spines along the abdominal and thoracic edge, 16 or 17 of which are anterior to the ventral fin. *Colours*—golden shot with purple, lines formed of spots along the rows of scales in the upper third of the body, a black spot on the shoulder.

The variety *C. selanghat*, is more elongated, its height being 3 to $3\frac{1}{2}$ in the total length: the height of the head only equals its length excluding the snout: its body is stouter. It is common in Burma and at the Andamans.

Habitat.—Seas and estuaries of India and Burma to the Malay Archipelago. It attains at least 8 inches in length.

2. **Chatoëssus modestus,** Plate CLX, fig. 1.

Day, Proc. Zool. Soc. 1869, p. 622.

B. vi, D. 14-16($\frac{3}{11-13}$), P. 16, V. 8, A. 27-28($\frac{3}{24-25}$), C. 21, L. 47, L. tr. 17.

Length of head 5 to $5\frac{1}{4}$, of caudal 4 to $4\frac{1}{2}$, height of body $2\frac{3}{4}$ to 3 in the total length. *Eyes*—diameter 3 to $3\frac{1}{2}$ in length of head, 3/4 of a diameter from end of snout, and 1 apart: profile above the nape slightly concave, then a great rise to the base of the dorsal fin: abdominal profile equally convex: snout moderately projecting over the lower jaw. The upper jaw reaches to opposite the centre of the anterior margin of the orbit, where it is bent suddenly downwards. *Fins*—dorsal commences slightly nearer to the snout than to the base of the caudal fin: it is high anteriorly, its upper edge concave. Pectoral reaches to above the ventral, which latter is inserted somewhat in advance of the origin of the dorsal. *Scales*—regularly arranged, with smooth edges, 17 to 18 serrations anterior to the ventral fin, and 11 to 12 posterior to it. Gill-rakers closely set and short, not exceeding 1/3 of the diameter of the eye. Free portion of the tail higher than long. *Colours*—yellowish shot with purple.

Habitat.—Along the Bassein River as high as the Een-gay-gyee Lake, also the Selwein at Moulmein. Many specimens were taken up to $5\frac{1}{2}$ inches in length.

3. **Chatoëssus manminna,** Plate CLX, fig. 2.

Clupanodon manminna and *cortius*, Ham. Buch. Fish. Ganges, pp. 247, 249, 383.
Chatoëssus manminna, Cuv. and Val. xxi, p. 114; Bleeker, Beng. p. 76.
Chatoëssus cortius, Cuv. and Val. xxi, p. 115; Günther, Catal. vii, p. 410.

B. vi, D. 14-15($\frac{2-3}{12-13}$), P. 15, V. 8, A. 22-24($\frac{3}{19-21}$), L. l. 58-63, L. tr. 22-24.

Length of head $4\frac{2}{3}$ to 5, of caudal $4\frac{2}{3}$ to $5\frac{1}{2}$, height of body $3\frac{2}{3}$ to $3\frac{3}{4}$ in the total length. *Eyes*—diameter 3 to $3\frac{1}{4}$ in the length of the head, 2/3 to 3/4 of a diameter from end of snout, and 1 apart. Abdominal profile usually much more convex than the dorsal. Snout prominent. Maxilla not reaching to the orbit. *Teeth*—absent. *Fins*—dorsal commences rather nearer the snout than the base of the caudal, and slightly in advance of the origin of the ventral, its last ray is slightly prolonged. Pectoral reaches the ventral. Caudal deeply forked, lower lobe the longer. *Scales*—irregularly arranged: 29 to 32 rows before the base of the dorsal fin: scutes strong, 17 between the throat and the base of the ventral fin, and 13 behind it. Gill-rakers rather closely set, and quite 1/3 as long as the eye. *Colours*—silvery glossed with gold: cheeks purplish: back with a bluish-green tint, and usually a black spot on the shoulder. Fins yellowish, the dorsal and caudal with dark outer edges.

Hamilton Buchanan termed the form destitute of the shoulder mark *C. cortius.*

Habitat.—Fresh waters of Sind, and the districts watered by the Indus and its branches, also the affluents and main streams of the Ganges, Jumna, Brahmaputra and Mahanuddi. It is spread through the tanks and estuaries of India and Assam, except the Deccan, Southern and Western India, and Ceylon. It attains at least 11 inches in length.

b.—Last dorsal ray prolonged.

4. Chatoëssus nasus, Plate CLX, fig. 4.

Clupea nasus, Bloch. t. 429, f. 1; Bloch, Schn. p. 426; Russell, Fish. Coromandel, ii, p. 77 and *Peddu kome*, pl. cxcvii.

Clupea thrissa, Russell, l. c. p. 76: and *kome*, pl. cxcvi.

Clupanodon nasica, Lacép. Poiss. v, pp. 468, 472.

Chatoëssus altus, Gray and Hard. Ill. Ind. Zool.; Jerdon, M. J. L. and Sc. 1851, p. 146; Day, Fish. Malabar, p. 243.

Chatoëssus eome, Richards. Erebus and Terror, Fish. p. 62, t. 31, f. 7-10.

Chatoëssus nasus, Cuv. and Val. xxi, p. 104; Swainson, Fishes, ii, p. 293; Bleeker, Beng. p. 74, Haring. p. 50, and Celebes, p. 223; Günther, Catal. vii, p. 407.

Chatoëssus selanghat, Kner, Novara Fische, p. 337 (*young*).

Dorosoma nasus, Bleeker, Atl. Ich. vi, p. 142, t. cclx, f. 4.

Noonah, Mal.: *Muddu candai*, Tam.: *Kome*, Tel. and Ooriah.

B. vi, D. 15-17($\frac{3-4}{12-13}$), P. 15, V. 8, A. 22-24($\frac{2}{20-22}$), C. 19, L. l. 46-50, L. tr. 18-19.

Length of head $4\frac{1}{2}$ to 5, of caudal $4\frac{1}{4}$ to $4\frac{1}{2}$, height of body $3\frac{1}{4}$ to $3\frac{1}{2}$ in the total length. *Eyes*—diameter $3\frac{3}{4}$ to 4 in the length of the head, 2/3 to 1 diameter from the end of snout, and $1\frac{1}{4}$ apart. Gape of mouth nearly twice as wide as the cleft is deep and overhung by the snout. Smooth portion of the opercle not quite twice as high as wide. *Fins*—the dorsal commences much nearer the snout than the root of the caudal, its last ray elongated, in some examples reaching to the base of the caudal fin. Pectoral as long as the head excluding the snout. Ventral inserted under the anterior dorsal rays. Caudal deeply forked. Gill-rakers short and rather widely set. *Scales*—with serrated edges, placed in regular rows; 28 scutes along the abdominal and thoracic edge, about 15 of which are anterior to the ventral fin: 18 rows of scales before the base of the dorsal fin. *Colours*—back grayish-green, with the centre of each scale in the first seven rows the darkest, thus forming horizontal lines, the lower of which do not extend to the caudal. Abdomen whitish, shot with gold. A bluish spot (sometimes absent) on the shoulder behind the upper half of the opercle. Preopercle of a brilliant golden tint. Dorsal greenish-yellow, with the posterior margin stained blackish. Pectoral, ventral, anal, and caudal yellowish, the last with a dark extremity.

This fish is figured in Bonnaterre, Enc. Method. pl. 76, as *Cailleu Tassart*, and given as *Clupea thrissa*, p. 186.

Habitat.—Seas of India to the Malay Archipelago and Philippine Islands. It is good eating, but bony.

Third group—Clupeæformes.

Upper jaw not projecting. Eyes with free adipose lids. Abdomen serrated.

Genus, 4—Clupea, sp. *Artedi.*

Clupanodon, Lacép. (pt.): *Harengula, Rogenia, Spratella, Sardinella, Clupeonia, Kowala, Meletta, Alausa*, Cuv. and Val.: *Clupalosa, Amblygaster* and *Clupeoides*, Bleeker: *Opisthonema, Brevoortia* and *Alausella*, Gill.

Body oblong or sub-elongated, with the serrature of the abdomen extending anteriorly into the thoracic region: upper jaw not projecting beyond the lower. Mouth anterior or antero-superior. Teeth, when present, rudimentary and deciduous. Dorsal fin situated opposite the ventrals: anal with a moderate, or large number of rays: caudal forked. Scales large, of moderate, or more rarely of small size. Pseudobranchiæ well developed.

Hyrtl, Denkschr. Ak. Wiss. Wien, x, 1855, p. 49, has remarked upon a rudimentary accessory branchial organ in one species of this genus from Brazil, *Clupea aurea*=*Clupanodon aureus*, Agassiz in Spix. Pisc. Bras. p. 52, t. 51.

Fishes of this genus are often much broader across the back when captured in fresh or brackish water than are those taken in the sea. Perhaps one reason is, that they enter the former localities to breed and whilst in good condition, whereas they return to the ocean to recover their health after breeding.

This genus has been sub-divided in accordance with its teething, a mode which is liable to the great objection that the teeth are small and deciduous. I would add to this that the same species shows great diversity, thus *Sardinella longiceps*, Cuv. and Val. was stated to have teeth on the palatines, pterygoid bones, and on the tongue: the same species captured from Malabar not having visible teeth, was placed as *Alosa scombrina*, Cuv. and Val. (see p. 637): again, *Meletta lile*, Cuv. and Val. destitute of teeth on the vomer, as seen in India, appears to be identical with *Clupea argyrotænia*, Bleeker, said to possess vomerine teeth. It is a subject well worthy of examination if, in some species, dentition is more developed as we progress eastwards. It is therefore necessary to remember while investigating species of *Clupea*, that the dentition is liable to variations as the teeth are deciduous.

SYNOPSIS OF SPECIES.

A.—*Teeth in lower jaw.**

a.—Teeth on tongue, palatines, pterygoids, but none on the vomer.

1. *Clupea kowal*, D. 19, A. 20-22, L. l. 45, L. tr. 11-12. Length of head 5, height of body $3\frac{1}{3}$ to $3\frac{1}{2}$ in the total. Eyes 3 in length of head. Seas of Africa and India to the Malay Archipelago.

2. *Clupea atricauda*, D. 18, A. 17-19, L. l. 44-45, L. tr. 11. Length of head $4\frac{3}{4}$, height of body $4\frac{3}{4}$ in the total. Eyes $3\frac{3}{4}$ to 4 in length of head. Caudal black tipped. Andamans to the Malay Archipelago.

3. *Clupea Klunzei*, D. 17-18, A. 17-18, L. l. 45, L. tr. 11-12. Length of head $4\frac{1}{2}$ to $4\frac{2}{3}$, height of body $4\frac{1}{2}$ to $4\frac{3}{4}$ in length of head. Eyes 3 to $3\frac{1}{4}$ in the length of head. Seas of India to the Malay Archipelago.

4. *Clupea leiogaster*, D. 17-18, A. 18-20, L. l. 40, L. tr. 11-12. Length of head 5 to $5\frac{1}{4}$, height of body $5\frac{1}{2}$ to 6 in the total length. Eyes $3\frac{1}{3}$ to 4 in the length of head. Ceylon to the Malay Archipelago.

5. *Clupea longiceps*, D. 16-17, A. 14-16, L. l. 45-48. Length of head $3\frac{3}{4}$ to 4, height of body 5 to $5\frac{1}{4}$ in the total length. Eyes $4\frac{1}{2}$ to 5 in the length of head. Seas of Sind and India to the Malay Archipelago.

b.—Teeth on tongue and palatines, none on pterygoid or vomer.

6. *Clupea fimbriata*, D. 18-19, A. 19-20, L. l. 45-48. Length of head 5 to $5\frac{1}{4}$, height of body 4 to $4\frac{3}{4}$ in the total length. Eyes $3\frac{1}{4}$ in length of head. Red Sea, seas of India to the Malay Archipelago.

c.—Teeth on tongue, none on palatines, pterygoids, or vomer.

7. *Clupea Sindensis*, D. 16-17, A. 18-19, L. 41-44, L. tr. 11. Length of head $4\frac{4}{5}$ to 5, height of body $4\frac{1}{2}$ to $4\frac{4}{5}$ in the total length. Eyes $4\frac{1}{4}$ in length of head. Tail fin sometimes dark tipped. Seas of Africa and India.

B.—*No teeth in the jaws.*

a.—Teeth on pterygoids and on the tongue: none on vomer or palatines.

8. *Clupea lile*, D. 14-15, A. 17-20, L. l. 38-40, L. tr. 9-10. Length of head 5 to $5\frac{1}{2}$, height of body $3\frac{1}{2}$ to $3\frac{2}{3}$ in the total length. Eyes 3 to $3\frac{1}{4}$ in length of head. Seas of India to the Malay Archipelago.

b.—No teeth inside mouth.

9. *Clupea variegata*, D. 15-18, A. 24-29, L. l. 90, L. tr. 35. Length of head $4\frac{1}{2}$ to $4\frac{2}{3}$, height of body 3 in the total length. Eyes 4 to $4\frac{1}{4}$ in the length of head. Fresh waters of Burma.

10. *Clupea chapra*, D. 14-16, A. 21-24, L. l. 80-110, L. tr. 33-35. Length of head $4\frac{1}{3}$ to $4\frac{1}{2}$, height of body $3\frac{1}{2}$ to 4 in the total length. Eyes $3\frac{1}{2}$ in the length of head. Fresh waters of India.

11. *Clupea ilisha*, D. 18-19, A. 19-22, L. l. 46-49, L. tr. 17-19. Length of head $4\frac{1}{4}$ to $4\frac{1}{2}$, height of body $3\frac{1}{2}$ to $3\frac{3}{4}$ in the total length. Eyes before the middle of length of head. Persian Gulf and seas of India to Burma and the Malay Archipelago: ascending rivers to breed.

12. *Clupea kanagurta*, D. 17, A. 20-21, L. l. 42-45, L. tr. 13-14. Length of head $4\frac{1}{4}$, height of body $3\frac{1}{4}$ to $3\frac{1}{2}$ in the total length. Eyes just in front of middle of length of head. Seas and estuaries of India and the Malay Archipelago.

13. *Clupea toli*, D. 16-17, A. 19-20, L. l. 39-40, L. tr. 13-14. Length of head 5 to $5\frac{1}{2}$, height of body $3\frac{1}{2}$ to 4 in the total length. Eyes $4\frac{1}{4}$ in length of head, 1 diameter from end of snout. Seas of India to the Malay Archipelago and China.

14. *Clupea melanura*, D. 15-16, A. 18-19, L. l. 38-40, L. tr. 10-11. Length of head 5, height of body 4 to 5 in the total length. Eyes 3 to $3\frac{1}{2}$ in length of head, 1 diameter from end of snout. Seas of India to the Malay Archipelago.

A.—*Teeth in lower jaw.*

a.—Teeth on tongue, palatines, pterygoids, but not on the vomer.

1. Clupea brachysoma, Plate CLXIII, fig. 3.

Kowala thoracata (Cuv. and Val. xx, p. 363?); Bleeker, Beng. p. 74; Cantor, Malay. Fish. p. 296; Jerdon, Mad. Journ. Lit. and Science, 1851, p. 145.

Sardinella brachysoma, Bleeker, Haring. p. 19.

Clupea brachysoma, Günther, Catal. vii, p. 423; Bleeker, Atl. Ich. vi, p. 104, t. 267, f. 2.

Alosa kowal, Günther, Fish. Zanzibar, p. 123.

Clupea kowal, Günther, Catal. vii, pp. 450-60 (pt.); Bleeker, Atl. Ich. vi, p. 109.

Currudden toaddy, Mal.

B. vi, D. 19($\frac{3}{16}$), P. 17, V. 8, A. 20-22($\frac{2-3}{18-19}$), C. 20, L. l. 45, L. tr. 11-12.

Length of head 5, of caudal $4\frac{1}{2}$, height of body $3\frac{1}{3}$ to $3\frac{1}{2}$ in the total length. *Eyes*—with broad adipose lids, diameter about 3 in the length of the head, nearly 1 diameter from the end of snout, and 4/5 of a diameter apart. Abdominal profile more convex than the dorsal. Lower jaw rather prominent: maxilla reaching to below the first third or middle of the eye. Opercle rather more than twice as high as wide. *Teeth*—a few on

* In some instances these are lost, occasionally they are very minute or even not developed.

either side of symphysis of lower jaw, fine ones on tongue, palatine and pterygoid bones: none on the vomer. *Fins*—dorsal commences midway between the end of the snout and the posterior extremity of the base of the anal fin. Pectoral reaches to above the ventral, the latter fin being inserted beneath the centre of the dorsal. Last two anal rays rather prolonged. Caudal deeply forked and covered with fine scales. *Scales*—regularly arranged, their edges crenulated, and with numerous transverse striæ. Scutes well developed, 18 before and 12 behind the base of the ventral fin. Free portion of the tail rather higher than long. *Colours*—greenish superiorly, the bases of the scales being a little dark: caudal fin dark tipped.

This fish is the species described by Cantor, and the teeth as he observes are distinct in his examples in the lower jaw, palatine and pterygoid bones. The height of its body, size of its eye and length of its caudal fin at once serve to distinguish it from *C. fimbriata*.

Habitat.—East Coast of Africa, Seas of India to the Malay Archipelago. It appears to be rare in India. The example figured was from Cochin.

2. **Clupea atricauda**, Plate CLXIV, fig. 5.

Harengula melanurus, Bleeker, Ceram, p. 245.
Clupea atricauda, Günther, Catal. vii, p. 426; Bleeker, Atl. Ich. vi, p. 106, t. 268, f. 5.

B. vi, D. 18($\frac{3}{15}$), P. 17, V. 8, A. 17-19($\frac{2-3}{15-17}$), C. 20, L. l. 44-45, L. tr. 11.

Length of head $4\frac{3}{4}$, of caudal 5, height of body $4\frac{3}{4}$ in the total length. *Eyes*—with broad adipose lids, diameter $3\frac{2}{3}$ to 4 in the length of the head, about 1 diameter from end of snout and 2/3 of a diameter apart. Dorsal and abdominal profiles nearly equally and slightly convex. The greatest height of the head equals its length excluding the snout. Lower jaw projecting beyond the upper: the posterior extremity of the maxilla reaches to beneath the first third of the eye, numerous fine radiating lines on the cheeks: opercle twice as high as broad. *Teeth*—a few small ones in front of lower jaw, a narrow band along the tongue, and some deciduous ones on the palatines and pterygoids, but none on the vomer. *Fins*—dorsal commences midway between the end of the snout and above the posterior extremity of the base of the anal fin. Pectoral as long as the head excluding the snout, and reaching 2/3 of the way to the ventral, which last is inserted beneath the middle of the dorsal fin. Last two anal rays thickened and slightly elongated. Lower caudal lobe sometimes slightly the longer. Gill-rakers numerous, closely set, and about 1/3 as long as the eye. *Scales*—regularly arranged, with crenulated outer margin: scutes small anteriorly, becoming stronger under the middle of the base of the pectoral fin, and 13 behind the base of the ventral. *Colours*—dark steel blue along the back and upper third of the body, divided by a yellowish line from the silvery sides and abdomen, which are glossed with blue and purple. Caudal with its extremity deep brown or black.

Habitat.—Andamans to the Malay Archipelago. The example figured was from Port Blair.

3. **Clupea Klunzei**, Plate CLXIII, fig. 1.

Harengula Klunzei, Bleeker, Ternate, p. 209.
Harengula Moluccensis, Bleeker, Ternate, p. 609.
Clupea Moluccensis, Günther (pt) Catal. vii, p. 427.
Clupea (Harengula) Moluccensis and *Klunzei*, Bleeker, Atl. Ich. vi, p. 107, t. 263, f. 1 and 2.

B. vi, D. 17-18($\frac{3}{14-15}$), P. 16, V. 8, A. 17-18($\frac{2}{15-16}$), C. 20, L. l. 45, L. tr. 11-12.

Length of head $4\frac{1}{2}$ to $4\frac{2}{3}$, of caudal 5 to $5\frac{1}{2}$, height of body $4\frac{1}{2}$ to $4\frac{3}{4}$ in the total length. *Eyes*—with broad adipose lids, diameter 3 to $3\frac{1}{4}$ in the length of the head, 1 diameter from the end of snout and 2/3 of a diameter apart. Dorsal and abdominal profiles about equally and slightly convex. Head about 1/5 longer than deep. Lower jaw prominent: maxilla reaching to beneath the middle of the eye: cheeks with numerous radiating striæ: opercle twice as high as wide. *Teeth*—a few on lower jaw, tongue, palatine and pterygoid bones: none on the vomer. *Fins*—dorsal commences midway between the end of the snout and above the posterior end of the base of the anal. Pectoral as long as the head excluding the snout, and reaching 2/3 of the distance to the base of the ventral, which last is inserted below the middle of the dorsal fin. Last two anal rays rather thickened and slightly elongated. Gill-rakers fine, about 1/3 as long as the eye, about 38 in the outer branch of lower branchial arch. *Scales*—in regular rows, with the edges roughened or finely crenulated. Thirty badly-developed scutes, about 13 behind the base of the ventral fin. *Colours*—bluish along the back becoming silvery white shot with purple on the sides and below.

Bleeker distinguished *C. Moluccensis* from *Klunzei*, chiefly by the length of the head in the former being 1/4 of that of the body excluding the caudal fin, and of the latter $3\frac{1}{2}$ to $3\frac{2}{3}$.

Habitat.—Ceylon, Andamans and Nicobars to the Malay Archipelago. The example figured was from the Andamans.

4. **Clupea leiogaster.**

Sardinella leiogaster, Cuv. and Val. xx, p. 270; Bleeker, Beng. p. 72.
Clupea leiogaster, Bleeker, Atl. Ich. vi, p. 102, t. 262, f. 6; Kner, Novara Fische, p. 327; Klunz. Fische. Roth. Meer. 1871, p. 598.
Clupea sirm, Günther, Catal. vii, p. 425, pt. (not Forsk. Rüppell, etc.)

B. vi, D. 17-18($\frac{4}{13-14}$), P. 17, V. 8, A. 18-20($\frac{3}{15-17}$), C. 17, L. l. 40, L. tr. 11-12.

Length of head 5 to $5\frac{1}{4}$, of caudal $5\frac{1}{2}$ to 6, height of body $5\frac{1}{2}$ to 6 in the total length. *Eyes*—with broad adipose lids, diameter $3\frac{1}{3}$ to 4 in the length of the head, 1 diameter from end of snout, and 3/4 to 4/5 of a diameter apart. Dorsal and abdominal profiles equally and slightly convex. The maxilla reaches to below the front edge of the eye. Opercle more than twice as high as wide. *Teeth*—in lower jaw, the palatines and pterygoids, and along the centre of the tongue, but none on the vomer. *Fins*—dorsal commences rather nearer the base of the caudal fin than the end of the snout. Ventral inserted beneath the second fourth of the dorsal. Pectoral as long as the head excluding the snout. Length of base of anal not quite equal to 1/2 the length of the head. *Scales*—with indistinct transverse striæ, and rough edges: scutes badly developed, about 32 in number. *Colours*—bluish green superiorly, becoming silvery white on the sides and beneath: sometimes a brownish mark on the shoulder. A longitudinal band along the body, with from 13 to 20 intensely blue spots.

Habitat.—Ceylon, to the Malay Archipelago.

5. Clupea longiceps, Plate CLXI, fig 2.

Sardinella longiceps, Cuv. and Val. xx, p. 273.
Alosa scombrina, Cuv. and Val. xx, p. 442; Bleeker, Beng. p. 74; Day, Fish. Mal. p. 236.
Sardinella lemuru, Bleeker, Nat. Tyds. Ned. Ind. iv, p. 500.
Sardinella Neohowii, Day, Fish. Malabar, p. 230 (not C. V.)
Clupea longiceps, Günther, Catal. vii, p. 428.
Clupea lemuru, Günther, l. c. p. 430; Bleeker, Atl. Ich. vi, p. 108, t. 267, f. 1.
Clupea scombrina, Günther, l. c. p. 448.
Lee-gur, Belooch.; *Louar*, Sind.; *Mutthi*, Canarese and North Malabar; *Charlay*, South Malabar, "Oil Sardine."

B. vi, D. 16-17($\frac{3}{13\text{-}14}$), P. 17, V. 9, A. 14-16($\frac{2}{12\text{-}14}$), C. 17, L. l. 45-48, L. tr. 13.

Length of head $3\frac{3}{4}$ to 4, of caudal 6, height of body 5 to $5\frac{1}{4}$ in the total length. The greatest height of the head equals its length behind the centre of the eye. *Eyes*—with broad adipose lids, diameter $4\frac{1}{2}$ to 5 in the length of head, $1\frac{1}{4}$ diameters apart, and 1 to $1\frac{1}{4}$ from end of snout. Lower jaw slightly the longer, the maxilla reaches to beneath the first 1/3 or centre of the eye. Opercle twice as high as wide. *Teeth*—fine ones on the tongue, very deciduous ones on palatines and more rarely on the pterygoids, very minute or absent from the lower jaw: none on the vomer. *Fins*—dorsal commences rather nearer the snout than the base of the caudal fin, its upper edge concave, its last two rays short. Pectoral as long as the postorbital portion of the head: ventral inserted in a line rather behind the middle of the dorsal. Anal low, the length of its base not quite 1/2 that of the head: its last two rays thickened and rather elongated. Caudal forked. *Scales*—indistinctly crenulated on the outer edge, and regularly arranged: 13 rows before the base of the dorsal fin: about 18 badly-developed scutes before and 13 or 14 behind the base of the ventral fin. Gill-rakers very numerous, about 1/2 longer than the eye. *Colours*—bluish along the back with golden reflections, abdomen silvery shot with purple, and sometimes a golden line divides the colour of the back from that of the sides: head of the same colour as the body, with a large greenish gold spot on the upper margin of the opercle and preopercle: dorsal greenish: caudal stained with green, the other fins transparent.

Dr. Bleeker having given me an excellent example of his *C. lemuru*, I could find no external difference between it and the Malabar oil sardine. The former however was said to have narrow bands of minute teeth on the tongue, palatine, and pterygoid bones, and such were visible in the example I received. The *Clupea scombrina*, C. V., was stated by Valenciennes and Günther to have no teeth on the tongue or palate, whereas I observed (*C. Neohowii*) that such existed in Malabar examples. I have since returned to Malabar and examined some hundreds of these fishes respecting this question, and in some examples certainly I was unable to see palatines and pterygiod teeth. Curiously the British Museum specimen (skin, preserved by myself) examined by Dr. Günther showed no palatine teeth; another example preserved the same day has no pterygoid but only a narrow strip of palatine teeth. On the Coromandel coast the palatine teeth become more distinct (*C. longiceps*), and according to Bleeker, would seem to be invariably present in examples from the Malay Archipelago.

Habitat.—Sind, down the Western coast of India, more rarely on the Eastern, Ceylon, the Andamans to the Malay Archipelago, where Bleeker observed *C. lemuru*. They attain about 8 inches in length, and large quantities of oil are made from them in Malabar; but along the Coromandel coast they never appear to arrive in sufficient quantities, whilst those that come are rarely fat as in Malabar. Abundant in some years, they occasionally forsake their haunts for several consecutive seasons, returning again in enormous quantities.

b.—Teeth on tongues and palatines, none on pterygoids or vomer.

6. Clupea fimbriata, Plate CLXI, fig. 3.

Harengus minor Indicus, Russell, Fish. Vizag. ii, p. 70, and *Kowal*, pl. 186.
? Clupea kowal, Rüppell, N. W. Fische, p. 79; Klunz. Fish. Roth. Meer, 1871, p. 599.
Spratella fimbriata, Cuv. and Val. xx, p. 359, t. 600; Bleeker, Beng. p. 74, and Haring. p. 27; Kner, Novara Fische, p. 329; Day, Fish. Malabar, p. 233.
Kowala lauta, Cantor, Catal. Mal. Fish, p. 270.

Clupea gibbosa, Bleeker, Celebes, p. 72, and Atl. Ich. vi, p. 106, t. 266, f. 6.
Clupea fimbriata, Günther, Catal. vii, p. 427 (part); Bleeker, Atl. Ich. vi, p. 105, t. 271, f. 5.
Clupea Sundaica, Bleeker, Atl. Ich. vi, p. 105.
Kich-uk-louar, Sind; *Cuttay-charlay*, Malabar: *Poonduringa*, Tam.: *Charree-addee*, Hind.

B. vi, D. 18-19($\frac{4}{14-15}$), P. 15, V. 8, A. 19-20($\frac{2}{17-18}$), C. 20, L. l. 45-48, L. tr. 11-12.

Length of head 5 to $5\frac{1}{4}$, of caudal $4\frac{1}{2}$ to $4\frac{2}{3}$, height of body 4 to $4\frac{3}{4}$ or even 5 in the total length. *Eyes*—diameter $3\frac{1}{4}$ in length of head, nearly 1 diameter from end of snout and also apart. Abdominal more convex than the dorsal profile. Lower jaw slightly prominent: the maxilla reaches to below the first third of the eye. Opercle about twice as high as wide: sub-opercle nearly triangular and rather longer than high. *Teeth*—deciduous in the jaws, a band along the middle of the tongue, a patch on the palatines, none on the vomer or pterygoids. *Fins*—dorsal rather higher anteriorly than its base is long, it commences midway between the end of the snout and the posterior extremity of the base of the anal, its upper border concave. Pectoral reaches 2/3 of the way to the ventral, the last fin being inserted under the middle of the dorsal. Last two anal rays thickened and a little prolonged. Caudal deeply forked. *Scales*—regularly arranged, with their free edges jagged. Scutes moderately developed, 14 or 15 posterior to the ventral fin, and 16 or 17 before it. Free portion of the tail rather higher than long. *Colours*—bluish-green, the sides silvery. Dorsal fin with numerous fine black dots, and a black mark at the base of its anterior rays. Caudal with bluish reflections and tipped with dark.

I think it evident that this is the fish alluded to by Russell, he observes that making their appearance in March they are abundant through the summer months. Having examined the figure of *C. Neohowii* with the late Dr. Bleeker, we came to the conclusion that it might be intended for this species.

Sardinella lineolata, Cuv. and Val. xx, p. 272, appears from the description, to differ from this species in the posterior frontals not being striated.

Having received some examples of *C. gibbosa* and *C. tembang*, Bleeker, from the Leyden Museum, and named by the author, I consider them identical with the foregoing. I have figured the highest example I have, in some the height of the body is only 1/5 of that of the total length, the variations in this respect being very great.

Habitat.—Red Sea, seas of India to the Malay Archipelago. It abounds in certain years off the Malabar coast. The example figured (life-size) was from Vizagapatam.

7. Clupea Sindensis, Plate CLXIII, fig. 2.

? *Meletta venenosa*, Cuv. and Val. xx, p. 377.
? *Alosa venenosa*, Günther, Fish. Zanzibar, p. 122.
? *Clupea venenosa*, Günther, Catal. vii, p. 449.

B. vi, D. 16-17($\frac{3}{13-14}$), P. 15, V. 8, A. 18-19($\frac{2}{16-17}$), C. 21, L. l. 41-44, L. tr. 11.

Length of head $4\frac{4}{5}$ to 5, of caudal fin $5\frac{1}{2}$ to 6, height of body $4\frac{1}{2}$ to $4\frac{4}{5}$ in the total length. *Eyes*—with rather broad adipose lids, diameter $4\frac{1}{4}$ in the length of head, $1\frac{1}{4}$ diameters from end of snout and 1 apart. The greatest height of the head rather exceeds its length excluding the snout. Lower jaw prominent. The maxilla reaches to below the first 1/4 of the eye. Preorbital with a raised and branched ridge. Opercles smooth: opercle about twice as high as wide: sub-opercle low and truncated posteriorly. *Teeth*—a narrow band along the tongue, fine ones in lower jaw, none on the vomer, palatines, or pterygoids. *Fins*—dorsal commences nearer the snout than the base of the caudal, its entire base being midway between these two points. Pectoral reaches 2/3 of the distance to the ventral, which latter fin is inserted below the middle of the dorsal. *Scales*—with their edges a little rough (especially in large examples) and having some vertical lines. Scutes not well developed, 13 to 14 behind the base of the ventral fin. Gill-rakers closely set, nearly as long as the eye. Gill cavity in Indian examples of a deep brown or black. *Colours*—back of an intensely deep blue; sides golden, shot with purple and blue. Fins yellowish, a black spot at base of dorsal anteriorly, and its upper edge dark: the end of the caudal lobes sometimes dark. There are also lines along the rows of scales in the upper 2/3 of the body: a small dark shoulder mark which is more or less lost in the adult.

Habitat.—Seas of the Seychelles, Sind and Bombay. It attains at least 8 inches in length. The example figured (life-size) was from Kurrachee.

B.—*No teeth in jaws.*

a.—*Teeth on pterygoids and tongue, none on vomer or palatines.*

8. Clupea lile, Plate CLXII, fig. 1.

Meletta lile, Cuv. and Val. xx, p. 378; Bleeker, Beng. p. 74.
Alausa champil, Cantor, Malay. Fish. p. 302 (not Gray and Hardwicke).
Rogenia argyrotænia, Bleeker, Haring. p. 26, and Banka, p. 457; Kner, Novara Fische, p. 328.

Clupea argyrotænia, Günther, Catal. vii, p. 423; Bleeker, Atl. Ich. vi, p. 101, t. 264, fig. 5.
Clupea lile, Günther, Catal. vii, p. 450.

B. vi, D. 14-15($\frac{3}{11-12}$), P. 13, V. 8, A. 17-20($\frac{2}{15-18}$), C. 21, L. l. 38-40, L. tr. 9-10.

Length of head 5 to $5\frac{1}{2}$, of caudal 5 to $5\frac{1}{2}$, height of body $3\frac{1}{2}$ to $3\frac{2}{3}$ in the total length. *Eyes*—with broad adipose lids, diameter 3 to $3\frac{1}{4}$ in the length of head, 2/3 of a diameter from end of snout and also apart. Dorsal profile nearly horizontal, abdominal very convex. Snout obtuse, lower jaw slightly the longer. The maxilla reaches to below the first third of the orbit. Smooth portion of opercle 1/4 higher than wide: sub-opercle almost triangular. *Teeth*—present on pterygoids, and a band along the centre of the tongue: none on jaws, vomer, or palatines. *Fins*—dorsal commences nearer the snout than the base of the caudal fin: its upper edge concave: pectoral not reaching to above the ventral, the latter being inserted under the anterior dorsal rays. Caudal moderately forked. Gill-rakers closely set and 1/2 as long as the eye: pseudobranchiæ well developed. *Scales*—rather adherent and in regular rows: their edges smooth: about 15 rows before the base of the dorsal fin: scutes strong, from 16 to 18 anterior, and 11 to 12 posterior to the base of the ventral fin. Free portion of tail as deep as long. *Colours*—golden shot with purple, a brilliant silvery band along the side, as deep as one scale. Caudal dark tipped, shot with blue. A brilliant bronze coloured spot on occiput.

In *Clupea argyrotænia*, Bleeker, that author noticed teeth on the vomer, the existence of which is denied by Günther: Dr. Bleeker having examined one of my Bombay examples with those in his collection, considered them to be distinct, the caudal fin being more dark in specimens from the Malay Archipelago.

Habitat.—Seas of India and Burma to the Malay Archipelago. It attains to about 4 inches in length. The example figured (life-size) was from Bombay. It is found in vast numbers along the Western coast of India.

b.—No teeth inside mouth.

9. **Clupea variegata**, Plate CLXI, fig. 4.

Day, Proc. Zool. Soc. 1869, p. 623.

B. vi, D. 15-18($\frac{3-4}{12-13}$), P. 17, V. 8, A. 24-29($\frac{3}{21-26}$), C. 17, L. l. 90, L. tr. 35.

Length of head $4\frac{1}{2}$ to $4\frac{2}{3}$, of caudal 4 to $4\frac{1}{2}$, height of body 3 in the total length. *Eyes*—with broad adipose margins, diameter 4 to $4\frac{1}{2}$ in length of head, 3/4 of a diameter from end of snout, above 1 apart. Abdominal profile more convex than the dorsal. Jaws of about equal length: the maxilla extending to beneath the centre of the orbit. Opercles smooth. *Teeth*—very minute on tongue if present: none on jaws, vomer, or palatines. *Fins*—dorsal commences rather nearer to the snout than to the base of the caudal: ventrals situated below the first third of the dorsal fin: anal in the posterior third of the distance between the posterior margin of the orbit and the base of the caudal fin. *Scales*—regularly arranged behind a line from the opercles to the base of the anal fin, anterior to which they are very irregular. Pseudobranchiæ well developed. Gill-rakers closely set, and not quite as long as the eye. Serrated scales commence under the middle of the pectoral; ten are posterior to the ventral fin, and about ten anterior to it. *Colours*—silvery, glossed with gold and bronze. A dark humeral spot. A row of about 18 bars passes across the back and descends a short way over the sides. Dorsal fin with a black band in the lower portion of its posterior half. End of tail tipped with black.

This appears to be the Burmese representative of *C. chapra*.

Habitat.—Irrawaddi and its branches. Many specimens procured up to 7 inches in length.

10. **Clupea chapra**, Plate CLXI, fig. 1.

Clupanodon chapra, Ham. Buch. Fish, Ganges, pp. 248, 283.
Clupea Indica, Gray and Hard. Ill. Ind. Zool fig. (from H. B.'s MSS.); Günther, Catal. vii, p. 444.
Clupea champil, Gray and Hard. l. c. fig. (? young).
Alausa microlepis, Cuv. and Val. xx, p. 439; Bleeker, Beng. p. 145.
Pellona champil, Cuv. and Val. xx, p. 324.
Clupea chapra, Day, Proc. Zool. Soc. 1869, p. 385.
Coori, Bengali.

B. vi, D. 14-16($\frac{2-3}{12-13}$), P. 13, V. 8, A. 21-24($\frac{2}{19-22}$), C. 17, L. l. 80-110, L. tr. 33-35.

Length of head $4\frac{1}{3}$ to $4\frac{1}{2}$ (4 in the young), of caudal $4\frac{1}{2}$ to 5, height of body $3\frac{1}{2}$ to 4 in the total length. *Eyes*—with broad adipose lids, diameter $3\frac{1}{2}$ to 4 in the length of head, 2/3 of a diameter from end of snout, and 1 to $1\frac{1}{4}$ apart. Abdominal profile more convex than the dorsal: the maxilla straight and rather narrow, reaching to below the anterior third or centre of the orbit: opercle 2/3 wide as deep: sub-opercle large, tapering posteriorly. *Teeth*—absent. *Fins*—origin of dorsal opposite or slightly before that of the ventral, and a little nearer the snout than the base of the caudal fin, it is highest anteriorly: pectoral does not quite reach the ventral, anal highest in front: caudal deeply forked, lower lobe slightly the longer, centre rays not so long as one diameter of the orbit. *Scales*—smooth, placed in horizontal rows except over the abdomen: 18 to 19 scutes anterior and 9 to 10 posterior to the ventral fin: 23 to 25 rows before the base of the dorsal fin.

Colours—silvery shot with gold, back rather dark, and edge of caudal stained darkest: a dark spot, which is sometimes absent, on the shoulder. *Gill-rakers*—closely set, very numerous and rather shorter than the eye, caudal peduncle as high as long.

Habitat.—Fresh waters of rivers and tanks of Sind and throughout India as far south as the Kistna River, but absent from the Malabar coast and Madras. It attains at least 8 inches in length.

11. Clupea ilisha, Plate CLXII, fig. 3.

Clupea, Russell, ii, p. 77, and *Palasah*, pl. 198.

Clupanodon ilisha, Ham. Buch. Fish. Ganges, pp. 243, 382, pl. 19, f. 73.

Alausa palasah, Cuv. and Val. xx, p. 432; Cantor, Catal. p. 300; Bleeker, Beng. p. 74; Jerdon, Madr. J. L. and Sc. xv, p. 345, and 1851, p. 145; Day, Fishes of Malabar, p. 235.

Alausa Malayana, Bleeker, Ned. Tyds. Dierk. 1866, p. 294.

Alausa palasah, Bleeker, Beng. p. 74.

Clupea palasah, Günther, Catal. vii, p. 445.

"Sable fish" and "Hilsa" of Europeans; *Palasah*, Tel.; *Pulla*, Sind.; *Oolum*, Tamil: *Nga-tha-louk*, Burmese; *Hilsa*, Beng.

B. vi, D. 18-19($\frac{3}{15-16}$), P. 15, V. 9, A. 19-22($\frac{2}{17-20}$), C. 19, L. l. 46-49. L. tr. 17-19, Vert. 12/32-34.

Length of head $4\frac{1}{4}$ to $4\frac{1}{3}$, of caudal 5, height of body $3\frac{1}{2}$ to $3\frac{3}{4}$ in the total length. *Eyes*—with broad adipose lids, situated some distance before the middle of the length of the head, and from 1 to $1\frac{1}{2}$ diameters from the end of snout, and $1\frac{1}{2}$ apart. The posterior extremity of the maxilla reaches to below the middle or even hind edge of the orbit: lower jaw not projecting beyond the upper. The greatest width of the operele equals about 2/3 of its height: sub-opercle rounded posteriorly. *Teeth*—absent. *Fins*—dorsal commences a little nearer the snout than the base of the caudal fin, its upper edge concave. Pectoral reaches to above the origin of the ventral, which latter fin is inserted beneath the anterior half of the dorsal. Caudal deeply forked. Caudal peduncle as deep as long. *Scales*—in regular rows: many over the caudal fin. Gill-rakers numerous and as long as the eye: 16 to 17 scutes before and 14 to 15 behind the insertion of the ventral fin. Pseudobranchiæ well developed. *Colours*—silvery, shot with gold and purple: no spots in the adult, but a row of them along the upper third of the body in the immature, the most distinct of which is behind the upper third of the opercle. (I have seen them in examples from the Sunderbunds up to 10 inches in length.) The young are usually of a bronze colour along the back, with silvery sides and a burnished silvery band going from above the eye to the upper half of the caudal fin, whilst the caudal fin is often deeply edged with black in its entire circumference.

The main body of these fish swarm up all the larger rivers of India and Burma, generally as soon as the monsoon commences, whilst an important matter appears to be the rapidity of the current. The numerous Indian rivers spanned by weirs, destitute of fish passes, is causing enormous injury to these fisheries. Almost fruitless to deposit their eggs below these structures when between the sea and their spawning beds, whilst they are unable to pass them, their partial or even entire extermination in such rivers appears to be merely a question of time.

Amongst such rivers as I have personally examined, the following appears to be the periods when these fish most commonly ascend. In the Cauvery and Coleroon of Madras, they pass up with the first burst of the South-west Monsoon (about the first or second week of June), and continue for the succeeding four months but in smaller quantities, some evidently being late breeders, perhaps younger fish. In the Kistna, which has a great velocity, the freshes commence in June, continuing to the end of October, after which the river subsides, although it is not fordable until the middle or end of January: a few of these fishes arrive at the end of September when the strength of the current is subsiding, but it is the middle of October and two following months, that the main body ascends, while they are absent by April. In the neighbouring river, the Godavery, which has a less rapid current, the fish ascend earlier, being most numerous from July to September. In the Hooghly they continue their ascent throughout the South-west Monsoon, continuing to nearly the end of the year. They have been observed in the Irrawaddi in Burma as high as Mandalay, in October. They are excellent as food until they have deposited their ova, when they become thin and positively unwholesome. Their flavour has been compared to a combination of that of the salmon and herring: they are rather heavy of digestion.

Habitat.—Persian Gulf ascending the Tigris, the coasts of Sind, India, and Burma, passing up the large rivers to breed, also the Malay Archipelago. I have taken them as high as Delhi, and Hamilton Buchanan records them from Agra and Cawnpore.

12. Clupea kanagurta, Plate CLXII, fig. 4.

Clupea, Russell, Fish. Vizag. ii, p. 75, and *Keelee*, pl. 195.

Clupeonia Blochii, Cuv. and Val. xx, p. 353; Bleeker, Beng. p. 74.

Alosa kanagurta, Bleeker, Haring. p. 34, Beng. p. 74, and Atl. Ich. vi, p. 114, t. 265, f. 5.

Alosa chapra, Günther, Fish. Zanz. p. 123 (not Gray).

Clupea ilisha,* Günther, Catal. vii, p. 445; Kner, Novara Fische, p. 331.

B. vi, D. 17($\frac{3}{14}$), P. 16, V. 8, A. 20-21($\frac{3}{17-18}$), C. 19, L. l. 42-45, L. tr. 13-14.

Length of head $4\frac{1}{4}$, of caudal $4\frac{1}{2}$, height of body $3\frac{1}{4}$ to $3\frac{1}{2}$ in the total length. *Eyes*—with a broad adipose membrane on either side, diameter 4 in the length of the head, 1 diameter from the end of snout and about 1 apart. Abdominal profile more convex than that of the back. The thickness of the body at the shoulder equals 2/5 of its height. Greatest width of the smooth portion of the opercle is nearly 1/2 its depth: subopercle tapering behind to its posterior-superior angle. Lower jaw scarcely projects beyond the upper. The maxilla extends posteriorly to below the hinder third of the orbit. *Teeth*—absent. *Fins*—dorsal commences midway between the front end of the snout and the end of the base of the anal fin, its greatest height rather exceeds the length of its base: its upper edge concave. Pectoral rather more than 1/2 as long as the head and does not quite reach to above the ventral, which last is situated rather behind the middle of the dorsal, and extends 2/5 of the distance to the base of the anal. Free portion of the tail rather higher at its base than long. *Scales*—regularly arranged: scutes 27, 11 behind the base of the ventral fin. *Colours*—bluish green superiorly, gold dotted with purple on the sides and beneath. Generally a row of about six or eight oval spots pass in a line from behind the upper edge of the opercle along the side. Upper edge of dorsal with a dark mark.

Habitat.—East Coast of Africa, Sind, coasts of India to the Malay Archipelago.

13. Clupea toli, Plate CLXII, fig. 2.

Clupea Sinensis, Bloch, t. 405; Bl. Schn. p. 424 (? Gmel. Linn. p. 1408).
Alausa toli, Cuvier and Valenciennes, xx, p. 435; Cantor, Catal. p. 299; Bleeker, Beng. p. 74.
Alosa ctenolepis, Bleeker, Haring. p. 32, and Nat. Tyds. Ned. Ind. iii, p. 74.
Clupea toli and *chapra* (not Ham. Buch.) Günther, Catal. vii, p. 447.
Alosa toli, Bleeker, Atl. Ich. vii, p. 113, t. 265, f. 4.
Oolum, Tamil.

B. vi, D. 16-17($\frac{3-4}{13-14}$), P. 14, V. 9, A. 19-20($\frac{2-3}{17}$), C. 24, L. l. 39-40, L. tr. 13-14.

Length of head 5 to $5\frac{1}{2}$, of caudal $4\frac{1}{4}$, height of body $3\frac{1}{2}$ to 4 in the total length. *Eyes*—with broad adipose lids, diameter $4\frac{1}{4}$ in the length of head, 1 diameter from end of snout, and also apart. Lower jaw rather projecting beyond the upper, which latter is notched at its extremity. Opercle 1/2 to 3/4 higher than wide: subopercle tapering posteriorly. *Teeth*—absent from the jaws. *Fins*—dorsal commencing nearer the snout than the base of the caudal fin, its entire base being midway between those two points, it is 1/5 higher than long and concave superiorly. Pectoral as long as the head excluding the snout and not reaching the ventral, which latter is inserted under the commencement of the last half of the dorsal fin. Caudal deeply forked, its lobes being longer than the head, especially in adult examples. Caudal peduncle a little longer than deep. *Scales*—regularly arranged, striated, and with crenulated or jagged edges: fine ones on the caudal fin. Scutes well developed, 17 to 18 before, and 12 to 13 posterior to the base of the ventral fin. The longest gill-rakers in the young, about equal the diameter of the eye, they are said to be longer in some adults. Pseudobranchiæ well developed. *Colours*—silvery, shot with yellow and purple, a dark shoulder spot in the young.

The eye is comparatively smaller and the caudal lobes much longer in the adult than in the young. *C. macrura* is very similar but has L. l. 44 to 46, and its scales with smooth edges, whilst its longest gill-rakers are stated to be much shorter than the eye. I can find no difference between *C. chapra*, Günther, and *C. toli*, C. V.

Professor Peters (April 4th, 1878) observes of *C. Sinensis*, Bloch, "We have a dried specimen, which still has an original label, hardly visible, glued to it, and which after a careful examination and comparison, I take for the type of the figure, although it has a black spot on the shoulder, or behind the operculum, not shown in the figure. * * I am of opinion *C. Sinensis*, Bloch. is *C. toli*, Cuv. and Val."

Habitat.—From Bombay through the seas of India to the Malay Archipelago and China. It attains at least 3 feet in length. It does not appear to ascend rivers to breed like the *C. ilisha*, but is sometimes found at their mouths. The example figured (life-size) was from Bombay.

14. Clupea melanura.

Alausa melanurus, Cuv. and Val. xx, p. 441; Bleeker, Bali, p. 10, Haring. p. 32; Day, Fish. Malabar, p. 235.

Clupea melanura, Günther, Catal. vii, p. 449; Bleeker, Atl. Ich. vi, p. 111, t. cclxix, f. 5.

B. vi, D. 15-16($\frac{3-4}{12-13}$), P. 13, V. 8, A. 18-19($\frac{3}{15-16}$), C. 19, L. l. 38-40, L. tr. 10-11.

Length of head 5, of caudal 5, height of body 4 to 5 in the total length. *Eyes*—with very narrow adipose lids, diameter 3 to $3\frac{1}{2}$ in length of head, 1 diameter from end of snout, 3/4 of a diameter apart. Dorsal profile very nearly straight: abdominal more convex: lower jaw rather longer than the upper: the maxilla extending to beneath the anterior third or middle of the orbit. *Teeth*—absent, or a few above the symphysis of the lower jaw. *Fins*—dorsal commences opposite to or slightly in front of ventral, and a little nearer

* In Dr. Günther's Catalogue of the Fishes in the British Museum, he gives *Alausa toli*, Cantor, as a synonym of this species, recording amongst the examples present—"*a. b.* Adult and young, skins. Pinang from Dr. Cantor's collection." This is very misleading, as Dr. Cantor's type was 1 foot 6 inches, a length this species never attains. The longest of the two examples in the British Museum is about 12 inches, and though not Cantor's type, is the true *Clupea toli*, C. V. the smaller specimen is *C. kanagurta*.

the snout than to the base of the caudal fin: pectoral does not reach the ventral, which latter does not extend half-way to the base of the anal: caudal deeply forked, the lower lobe the longer. *Scales*—in regular horizontal rows, with two or three raised lines along their base, 25 serrated scales along the abdominal edge. *Colours*—back blue, shot with purple: a fine yellow line dividing it from the silvery sides and abdomen: a blue spot on the opercle; outer third of caudal lobes black.

Habitat.—Seas of India and the Malay Archipelago.

Genus, 5—Corica, *Hamilton Buchanan.*

Clupeoides and *Clupeichthys*, Bleeker.

Body oblong, moderately compressed. Lower jaw the longer. Teeth, when present, rudimentary and deciduous. Dorsal fin situated nearly opposite the ventral: anal of moderate extent, its last rays may be thickened and detached. Caudal forked. Scales of medium size: abdomen serrated, serrature usually commencing behind the pectoral fins.

Geographical distribution.—India to the Malay Archipelago.

SYNOPSIS OF SINGLE SPECIES.

Corica soborna, D. 16, A. 15 + ii, L. l. 40, L. tr. 9-10.

Corica soborna, Plate CLXII, fig. 5.

Ham. Buch. pp. 253, 283; Gray and Hard. Ill. Ind. Zool. (copied from H. B.'s MS. drawing, and name mis-spelt *C. guborni*); Day, Proc. Zool. Soc. 1869, p. 385.

Pellona soborna, Cuv. and Val. xx, p. 325; Bleeker, Beng. p. 74.

Corica argentata, Swainson, Fishes, ii, p. 294.

? *Spratella pseudopterus*, Bleeker, Borneo, p. 432 and Haring. p. 50.

? *Clupeoides pseudopterus*, Günther, Catal. vii, p. 452.

Corica pseudopterus, Bleeker, Atl. Ich. vi, p. 98, t. 260, f. 3.

Cutwaal ursi and *God-haee*, Ooriah.

B. vi, D. 15-16($\frac{3}{12-13}$), P. 13, V. 8, A. 14-15 + ii ($\frac{2}{12-13}$), C. 19, L. l. 40-42, L. tr. 10.

Length of head $5\frac{1}{4}$ to $5\frac{1}{2}$, of caudal $5\frac{1}{2}$, height of body 5 to $5\frac{1}{2}$ in the total length. *Eyes*—diameter 2/5 of length of head, 1/2 a diameter from end of snout, 2/3 of a diameter apart. Body elongated, strongly compressed. Maxilla reaches to below the middle of the orbit. *Fins*—dorsal arises rather nearer the base of the caudal than the snout, and rather behind the origin of the ventrals: the anal commences under the posterior extremity of the dorsal and has its last two rays detached: caudal forked in its posterior third, the lower lobe the longer. *Scales*—10 or 11 serrated scales along its abdominal edge, commencing below the pectoral fin: anterior to the ventral fin there are 10 or 11, and 7 or 8 posterior to it. *Colours*—silvery, with a light band.

Habitat.—Orissa and Bengal: rarely attaining above 2 inches in length. The example figured (life-size) was from Orissa.

Genus, 6—Pellona, *Cuvier and Valenciennes.*

Ilisha, Gray: *Platygaster*, Swainson.

Branchiostegals six. Body rather elongated and strongly compressed, with the thoracic and abdominal edges serrated. Mouth of moderate size, upper jaw generally emarginate and shorter than the lower. Fine sharp teeth in the jaws, palatines, and pterygoid bones, also on the tongue, but none on the vomer. Dorsal fin small, median. Ventrals small, inserted anterior to the dorsal: anal elongated. Scales large, or of moderate size, rarely small.

Owing to the individual variations amongst examples of this genus they are difficult to distinguish: besides which, the types of Cuvier and Valenciennes require to be thoroughly re-examined.

SYNOPSIS OF SPECIES.

A.—*Dorsal fin almost or entirely in advance of the anal.*

1. *Pellona filigera*, A. 46-50, L. l. 50, L. tr. 15-16. Head $5\frac{1}{4}$, height of body $3\frac{3}{4}$ to 4 in the total length. Scutes 22-23 before, 10-12 behind ventral fin. Bombay.

2. *Pellona elongata*, A. 40-49, L. l. 52-56, L. tr. 16. Head $4\frac{3}{4}$ to $5\frac{1}{4}$, height of body $4\frac{1}{4}$ to $4\frac{1}{2}$ in the total length. Scutes 20-24 before, and 8-10 behind ventral fin. Seas of India to Japan.

3. *Pellona motius*, A. 40-41, L. l. 43-45, L. tr. 12-13. Head 5, height of body 4 to $4\frac{1}{4}$ in the total length. Scutes 15-16 before, and 7-8 behind ventral fin. Fresh waters and estuaries of Bengal and Orissa.

4. *Pellona Indica*, A. 39-40, L. l. 44, L. tr. 13-14. Head $4\frac{1}{3}$, height of body $3\frac{1}{4}$ to $3\frac{1}{2}$ in the total length. Scutes 18 before, and 7-8 behind ventral fin. East coast of Africa, seas of India to the Malay Archipelago.

5. *Pellona ditchela*, A. 36-40, L. l. 40-44, L. tr. 14. Head $4\frac{1}{2}$, height of body $4\frac{1}{4}$ in the total length. Scutes 23 before, and 10 behind ventral fin. Coromandel coast of India.

6. *Pellona Hoevenii*, A. 36, L. l. 43. Head $4\frac{1}{2}$, height of body $3\frac{1}{2}$ in the total length. Scutes 13 before, and 9 behind ventral fin. A bone armed with teeth situated in place of ligament between premaxillary and maxillary bones. Coromandel coast of India to the Malay Archipelago.

B.—*Dorsal fin situated entirely or partially over the anal.*

7. *Pellona brachysoma*, A. 46-51, L. 43-44, L. tr. 14-15. Head $4\frac{1}{2}$ to $4\frac{2}{5}$, height of body $3\frac{1}{4}$ to $3\frac{1}{2}$ in the total length. Scutes 18 before, and 8 behind ventral fin. Seas of India to the Malay Archipelago.

8. *Pellona megaloptera*, A. 43-50, L. l. 48-50, L. tr. 14-15. Head $4\frac{1}{4}$ to $4\frac{2}{3}$, height of body $3\frac{2}{3}$ to 4 in the total length. Scutes 22 anterior, and 8 behind ventral fin. Seas of India to the Malay Archipelago.

9. *Pellona Sladeni*, A. 44, L. l. 48, L. tr. 10. Head 5, height of body $5\frac{1}{4}$ in the total length. Scutes 23 anterior, and 10 behind ventral fin. Irrawaddi river in Burma.

10. *Pellona Leschenaultii*, A. 42, L. l. 70. Height of body 4 in the total length. Pondicherry.

A.—*Dorsal fin almost or entirely in advance of the anal.*

1. Pellona filigera, Plate CLXV, fig. 4.

Cuvier and Valenciennes, xx, p. 322; Bleeker, Beng. p. 72.

? Pellona xanthoptera, Bleeker, Haring. p. 49, and Nat. Tyds. Ned. Ind. ii, p. 439; Günther, Catal. vii, p. 457.

? Ilisha xanthoptera, Bleeker, Atl. Ich. vi, p. 122, t. 265, f. 3.

B. vi, D. 18-19$(\frac{3-4}{15-16})$, P. 17, V. 8, A. 46-50$(\frac{3}{43-47})$, C. 19, L. l. 50, L. tr. 15-16.

Length of head $5\frac{1}{4}$, of caudal 5, height of body $3\frac{3}{4}$ to 4 in the total length. *Eyes*—diameter 3 in the length of the head, 3/4 of a diameter from the end of snout, and 1/3 apart. Abdominal profile much more convex than that of the back: a slight concavity over the front end of the head. The maxilla reaches to below the middle of the eye. The posterior portion of the ridges on the occiput are parallel one to the other. *Teeth*—in jaws, tongue, and palate. *Fins*—dorsal commences about midway between the snout and base of the caudal fin, its posterior rays are not above the anal. Ventral fin very short, situated midway between suboperele and base of the anal. Pectoral reaches to above the ventral, its upper ray is very broad. Length of base of anal fin equals $2\frac{2}{3}$ in the total length excluding the caudal fin. Caudal lobes elongated. *Scales*—19 to 20 rows anterior to the base of the dorsal fin. Scutes well developed 22 to 23 before, and 10 or 12 posterior to the base of the ventral fin. *Colours*—of a coppery tinge along the back, sides silvery, with mother-of-pearl reflections. Dorsal and pectoral fins black tipped.

Habitat.—Bombay, to 1 foot in length.

2. Pellona elongata, Plate CLXIV, fig. 3, and CLXV, fig. 1.

Alosa elongata, Bennett, Life of Sir S. Raffles, p. 691.

Clupea affinis, Gray and Hardwicke, Ill. Ind. Zool.

Platygaster affinis, Swainson, Fishes, ii, p. 294.

Ilisha abnormis, Richard. Ich. China, p. 306.

? Clupea melastoma, Temm. and Schleg. Fauna Japon. Poiss. p. 237. t. 108, f. 1; Bleeker, Batav. p. 409 (not Bloch).

Pellona Grayana, Cuv. and Val. xx, p. 315; Bleeker, Haring. p. 25.

Pellona affinis, Cantor, Catal. Malay. Fish. p. 291.

Pellona Schlegelii, Bleeker, Japan, p. 118.

Pellona elongata, Günther, Catal. vii, p. 456.

Ilisha elongata, Bleeker, Atl. Ich. vi, p. 119, t. 259, fig. 3.

B. vi, D. 15-17$(\frac{3}{12-14})$, P. 15, V. 7, A. 40-49$(\frac{3}{37-46})$, C. 17, L. l. 52-56, L. tr. 16.

Length of head $4\frac{3}{4}$ to $5\frac{1}{4}$, of caudal fin 5, height of body $4\frac{1}{4}$ to $4\frac{1}{2}$ in the total length. *Eyes*—diameter $3\frac{1}{4}$ to 4 in the length of head, 1 diameter from end of snout, and 1/2 a diameter apart. Abdominal profile more convex than that of the back. The maxilla reaches to below the middle of the eyes. The posterior halves of the ridges on the occiput are nearly parallel one to the other. *Teeth*—in jaws, tongue and palate. *Fins*—dorsal commences midway between the snout and the base of the caudal fin, its last rays do not extend to over the commencement of the anal. Ventral minute, situated midway between the hind margin of the head and the commencement of the anal fin. Length of base of anal fin equal from 3 to $3\frac{1}{4}$ in the total length excluding the caudal fin. *Scales*—abdominal scutes well developed, 20 to 24 anterior, and eight or ten posterior to the base of the ventral fin. *Colours*—silvery, shot with mother-of-pearl. Fins yellowish, edge of dorsal black tipped.

It appears possible that this may be *P. novacula*, Cuv. and Val. xx, p, 319, but is not *P. novacula*, Bleeker, wherein the maxilla extends posteriorly to nearly behind the hind edge of the orbit.

Habitat.—Seas of India to the Malay Archipelago, China, and Japan. The example figured Plate CLXIV, fig. 3 (half natural size), was from Sind. A variety with a more pointed head and rather fewer scales (l. l. 46, L. tr. 14), is figured (half natural size), Plate CLXV, fig. 1, from Bombay.

3. Pellona motius, Plate CLXV, fig. 3.

Clupanodon motius, Ham. Buch. Fish. Ganges, pp. 251, 383.

Clupea motius, Gray and Hard. Ill. Ind. Zool. (from H.B.'s MSS.)

Platygaster parva, Swainson, Fishes, ii, p. 294.

Pellona motius, Bleeker, Beng. p. 72; Günther, Catal. vii, p. 456 (part).

Ursi or *Alise*, Ooriah.

B. vi, D. 16-17$(\frac{3}{13-14})$, P. 15, V. 7, A. 40-41$(\frac{3}{37-38})$, L. l. 43-45, L. tr. 12-13.

Length of head 5, of caudal fin $5\frac{1}{4}$, height of body 4 to $4\frac{1}{4}$ in the total length. *Eyes*—diameter 1/3 of length of head, 3/4 of a diameter from end of snout, and 1/2 a diameter apart. Body very compressed,

abdominal profile more convex than that of the back. The maxilla reaches to beneath the middle of the orbit. The posterior halves of the ridges on the summit of the head are nearly parallel one to the other. *Teeth*—on jaws, tongue and palate. *Fins*—origin of dorsal fin slightly nearer to the snout than to the base of the caudal, and situated entirely in front of the anal, the length of the base of this latter fin being equal to 1/3 of that of the total length excluding the caudal fin: ventral fin nearly as long as the eye. *Scales*—16 rows anterior to the base of the dorsal fin: there are seven to eight scutes along the abdominal profile posterior to the base of the ventral, and 15 or 16 anterior to it. *Colours*—silvery, with mother-of-pearl reflections, and having a burnished lateral-band. There are some fine dots on the fins, and along the edges of some of the scales. Caudal fin with a dark outer edge: a dark band along the middle of the dorsal fin.

Habitat.—Assam, Bengal and Orissa, descending as low as the coast. It does not appear to attain much above 4 inches in length. The example figured (life-size), was from Orissa.

4. **Pellona Indica**, Plate CLXIV, fig. 4.

Clupea, Russell, Fish. Vizag. ii, p. 78, and *Ditchoee*, pl. 192.
Platygaster Indicus, Swainson, Fishes, ii, p. 294.
Pellona ditchoa, Cuv. and Val. xx, p. 313; Bleeker, Beng. p. 72, and Haring. p. 24; Günther, Catal. vii, p. 455.
Pellona Indicus, Jerdon, M. J. L. and Sc. 1851, p. 145.
Ilisha Indica, Bleeker, Atl. Ich. vi, p. 118, t. 259, f. 4.
Poo-na-no-dah, Andamanese.

B. vi, D. 17($\frac{3}{14}$), P. 16, V. 7, A. 39-40($\frac{3}{36-37}$) C. 17, L. l. 44, L. tr. 13-14.

Length of head $4\frac{1}{3}$, of caudal fin $4\frac{3}{4}$, height of body $3\frac{1}{4}$ to $3\frac{1}{2}$ in the total length. *Eyes*—diameter $2\frac{2}{3}$ to 3 in the length of head, 2/3 of a diameter from end of snout and 1/2 a diameter apart. Abdominal profile more convex than the dorsal. The maxilla reaches to below the anterior 1/3 of the eye. Opercle rather more than twice as high as wide, not striated. The posterior halves of the ridges on the occiput are parallel one to the other. *Teeth*—in the jaws, tongue, palatine and pterygoid bones. *Fins*—dorsal commences rather nearer the snout than the base of the caudal fin, its base being entirely, or almost so, in advance of that of the anal, the length of the base of the latter fin being $2\frac{3}{4}$ to 3 in that of the body excluding the caudal fin. Ventral small, shorter than the eye and inserted rather in advance of the origin of the dorsal. *Scales*—with the edges rather roughened, and having one or two vertical lines: 25 to 26 scutes, 18 being between the throat and base of ventral fin. *Colours*—greenish along the back, becoming silvery shot with purple and gold on the sides and below: dorsal fin often tipped with black.

Pellona micropus, C. V. xx, p. 320, appears to be closely allied to this species, D. 17, A. 42, L. l. 47. Height of body $3\frac{1}{4}$ in the total length: 27 scutes along the abdominal edge.

Habitat.—East Coast of Africa, seas of India to the Malay Archipelago.

5. **Pellona ditchela**, Plate CLXV, fig. 5.

Clupea, Russell, Fish. Vizag. ii, p. 72, and *Ditchellee*, pl. 188.
Pellona ditchela, Cuv. and Val. xx, p. 314; Bleeker, Beng. p. 72.

B. vi, D. 18($\frac{3}{15}$), P. 16, V. 6, A. 36-40($\frac{3}{33-37}$), C. 19, L. l. 40-44, L. tr. 14.

Length of head $4\frac{1}{2}$, of caudal fin 5, height of body $4\frac{1}{4}$ in the total length. *Eyes*—diameter about 1/3 of length of head, nearly 1 diameter from end of snout, and 1/2 a diameter apart. Abdominal profile rather more convex than the dorsal. The maxilla reaches to below the middle of the orbit: anteriorly a bone, armed with teeth instead of a ligament, connects the premaxillaries to the maxilla (as in *P. Hoevenii*), The posterior halves of the ridges on the occiput converge. *Teeth*—in jaws, tongue, and palate. *Fins*—origin of the dorsal rather nearer the snout than the base of the caudal fin, whilst the fin is entirely in advance of the anal. Ventral nearly as long as the eye. Length of base of the anal equal to $3\frac{1}{2}$ in the total length excluding the caudal fin. *Scales*—scutes well developed, 23 anterior and 10 posterior to the base of the ventral fin. *Colours*—silvery, with a burnished lateral-band, the upper edge of the dorsal fin rather dark.

This may be *Clupea melastoma*, Bl. Schn. p. 427, and *Pellona melastoma*, Cuv. and Val. xx, p. 308, which has A. 34.

Habitat.—Coromandel Coast of India. I received several examples from Madras, where they were collected by Dr. Keess. Unfortunately they are not in a good state of preservation. None are larger than the example figured.

6. **Pellona Hoevenii**. Plate CLXV, fig. 6.

Bleeker, Haring. p. 21, and Nat. Tyds. Ned. Ind. iii, p. 712; Günther, Catal. vii, p. 455.
Ilisha Hoevenii, Bleeker, Atl. Ich. vi, p. 117, t. 269, f. 2.

B. vi, D. 18($\frac{3}{15}$), P. 17, V. 7, A. 36($\frac{3}{33}$), L. l. 43, L. tr. 13.

Length of head $4\frac{1}{2}$, of caudal 5, height of body $3\frac{1}{2}$ in the total length. *Eyes*—diameter $2\frac{2}{3}$ to 3 in the length of the head, 3/4 of a diameter from end of snout, and 1 apart. Abdominal profile rather more convex than that of the dorsal. The maxilla reaches to below the middle of the eye. Opercle rather more than twice

as high as wide. The posterior halves of the ridges on the occiput meet posteriorly. *Teeth*—on the jaws, tongue, palatine and pterygoid bones: also along a small accessory bone extending between the premaxillaries and the superior maxillary. *Fins*—dorsal commences rather nearer the snout than the base of the caudal fin, and is entirely or almost so, in advance of the anal: the length of the base of the latter fin being $3\frac{1}{3}$ in the distance between the snout and the base of the caudal. Ventral small, shorter than the eye. *Scales*—with the edges almost smooth: 22 scutes, 13 being anterior to the base of the ventral fin. *Colours*—greenish along the back, becoming silvery with mother-of-pearl reflections on the sides and beneath.

The chief points of difference between this species and *P. ditchoa*, consist in the posterior halves of the ridges in the occipital region being convergent and not parallel to one another: and in the ligament extending anteriorly from the premaxillaries to the maxillaries being replaced by a toothed bone.

Habitat.—Coromandel Coast of India where it abounds, to the Malay Archipelago.

B.—*Dorsal fin situated entirely or partially above the anal.*

7. Pellona brachysoma, Plate CLXIV, fig. 2.

Bleeker, Verh. Bat. Gen. xxiv, Haring. p. 22; Günther, Catal. vii, p. 456.
Ilisha brachysoma, Bleeker, Atl. Ich. vi, p. 118, t. 267, f. 5.

Paunia puiee, Ooriah.

B. vi, D. 16-17($\frac{3}{13\text{-}14}$), P. 16, V. 7, A. 46-51($\frac{3}{43\text{-}48}$), C. 17, L. l. 43-44, L. tr. 14-15.

Length of head $4\frac{1}{2}$ to $4\frac{2}{5}$, of caudal fin 5, height of body $3\frac{1}{4}$ to $3\frac{1}{2}$ in the total length. *Eyes*—diameter 3 in the length of head, 3/4 of a diameter from end of snout, and 1/2 a diameter apart. Abdominal profile more convex than that of the back. The maxilla extends to below the middle of the orbit. The posterior halves of the ridges on the occiput are nearly parallel one to the other. *Teeth*—on tongue, jaws, and palate. *Fins*—the dorsal commences midway between the snout and the posterior end of the base of the anal, over which latter fin its last few rays extend. Ventral small. Length of base of the anal fin $2\frac{1}{2}$ to $2\frac{2}{3}$ in the total excluding the caudal fin. *Scales*—18 scutes anterior to the ventral fin, and 8 posterior to it. *Colours*—golden glossed with purple.

Habitat.—Seas of India to the Malay Archipelago.

8. Pellona megaloptera, Plate CLXV, fig. 2.

Clupea, Russell, ii, p. 73, and *Jangarloo*, pl. 191.
Platygaster megalopterus, Swainson, Fishes, ii, p. 294.
Pellona Leschenaultii, Bleeker, Java, 11 (not Cuv. and Val.)
Pellona Russellii, Bleeker, Haring. p. 23.
Pellona megalopterus, Jerdon, M. J. L. and Sc. 1851, p. 145.
Pellona motius, Günther, Catal. vii, p. 456 (part).
Ilisha megaloptera, Bleeker, Atl. Ich. vi, p. 119, t. 264, f. 6.

B. vi, D. 17-18($\frac{3}{14\text{-}15}$), P. 17, V. 7, A. 43-50($\frac{3}{40\text{-}47}$), C. 17, L. l. 48-50, L. tr. 14-15.

Length of head $4\frac{1}{4}$ to $4\frac{2}{3}$, of caudal fin $4\frac{1}{2}$, height of body $3\frac{2}{3}$ to 4 in the total length. *Eyes*—diameter $2\frac{2}{3}$ to 3 in the length of the head, 3/4 of a diameter from end of snout, and 1/4 of a diameter apart. Abdominal profile slightly more convex than that of the back. The maxilla extends to nearly beneath the middle of the orbit. The posterior halves of the occipital ridges are parallel *Teeth*—on jaws, tongue, and palate. *Fins*—dorsal commences about midway between the snout and the base of the caudal fin, its last few rays are above the commencement of the anal, its first ray is over the centre of the interspace between the ventral and origin of the anal fins. Pectoral reaches to above the ventral, which last is not half so long as the eye, and is sometimes entirely absent. Length of base of anal equal to nearly 1/3 of the length of the body excluding the caudal fin. *Scales*—22 scutes anterior, and 8 posterior to the ventral fin.

Pellona Dussumieri, C. V. xx, p. 316, pl. 596, may be this species, but if so the ventral fins are shown larger than I have seen them in the fish: in fact they are minute and even absent in some examples. The origin of the dorsal fin is also shown as immediately above the insertion of the ventral.

Habitat.—Seas of India to the Malay Archipelago.

9. Pellona Sladeni, Plate CLXIV, fig. 1.

Day, Proceedings of the Zoological Society, 1869, p. 623.

B. vi, 13($\frac{3}{10}$), P. 11, V. 7, A. 44($\frac{3}{41}$), C. 21, L. l. 48, L. tr. 10.

Length of head 5, of caudal fin 8, height of body $5\frac{1}{4}$ in the total length. *Eyes*—diameter 1/4 of length of head, 1 diameter from end of snout. Ridges on the occiput slightly diverge posteriorly. The maxilla reaches to below the middle of the eye. *Fins*—first two dorsal rays in advance of anal, the remainder of the fin over it, it arises midway between the base of the caudal and the posterior extremity of the opercle. Pectoral reaches to nearly the end of the ventral, which is small. Caudal forked. 23 spinate scales exist on the abdominal profile anterior to the ventral fins, and 10 posterior to them. *Colours*—silvery, opercles golden; caudal edged with black.

Habitat.—Irrawaddi as high as Mandalay. A single example obtained, 7 inches in length.

10. Pellona Leschenaultii.

Cuv. and Val. xx, p. 311; Bleeker, Beng. p. 72; Günther, Catal. vii, p. 459.

D. 21, P. 17, V. 8, A. 42, C. 27, L. l. 70.

Height of body nearly 4 in the total length. Suborbital and opercle striated. *Teeth*—very distinct in premaxillaries and mandibles. *Fins*—pectoral large and rounded towards its extremity, and extending beyond the insertion of the ventrals which last are small, and arise about 8 or 9 rows of scales anterior to the origin of the dorsal. Anal elongated. *Colours*—silvery.

Habitat.—A single dried example (20 inches long) was brought from Pondicherry.

Genus, 7—Opisthopterus, *Gill.*

Pristigaster, sp. Cuv.

Branchiostegals six. Body oblong, compressed. The lower jaw projecting; the maxilla elongated posteriorly. Small sharp teeth in the jaws, palatines, pterygoids and tongue: none on the vomer. Dorsal fin situated behind the commencement of the anal, which has many rays: ventrals absent. Scales of moderate or small size, very deciduous: serrature along the abdominal profile well developed.

This genus is closely allied to the last, the chief difference being absence of ventral fins. Amongst examples of *Pellona* occasional ones are seen in which this fin is deficient.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Opisthopterus tartoor*, A. 56-62, L. l. 50. From Beloochistan through the seas of India to the Malay Archipelago.

1. Opisthopterus tartoor, Plate CLXIII, fig. 5.

Tartoore, Russell, Fish. Vizag. ii, p. 74, pl. 193.

Pristigaster tartoore, Cuv. Reg. Anim.; Cuv. and Val. xx, p. 328; Bleeker, Haring. p. 25; Day, Fish. Mal. p. 232; Günther, Catal. vii, p. 460.

Pristigaster Indicus, Swainson, Fishes, ii, p. 294; Jerdon. M. J. L. and Sc. 1851, p. 146.

Opisthopterus tartoor, Gill, Clupein. Proc. Acad. Nat. Phil. 1861, p. 38; Bleeker, Clupeoid. p. 296, and Atl. Ich. vi, p. 123, t. 263, f. 5.

B. vi, D. 15-17($\frac{3}{12-14}$), P. 14, A. 56-63($\frac{2}{54-61}$), C. 17, L. l. 50, L. tr. 12.

Length of head $5\frac{1}{2}$ to $5\frac{3}{4}$, of caudal 6, height of body $3\frac{2}{3}$ to 4 in the total length. *Eyes*—diameter $2\frac{3}{4}$ to 3 in length of head, 2/3 of a diameter from end of snout, 1/3 of a diameter apart. The maxilla reaches to below the anterior third or middle of the orbit, its length nearly half of that of the head: lower jaw very prominent: opercle 1/3 to 3/4 higher than wide. *Teeth*—on jaws, tongue, palatine, and pterygoid bones. *Fins*—origin of dorsal rather nearer base of caudal than to the axilla: the pectoral, somewhat longer than the head, reaches to over the first anal ray, and that fin commences midway between the end of the snout and the posterior extremity of its own base: caudal forked. *Scales*—very deciduous: 28 to 32 spines along the lower profile. Gill-rakers about 28, and nearly as long as the eye. Pseudobranchiæ well developed. *Colours*—silvery.

Dr. Bleeker questions whether the Malay Archipelago species is identical with the Malabar one, as in the latter the pectorals are longer than the head, reaching to the commencement of anal fin, the body is higher, and the caudal shorter.

Habitat.—From Gwadur in Beloochistan and Sind, through the seas of India to the Malay Archipelago. It attains at least 9 inches in length.

Genus, 8—Raconda, *Gray.*

Apterygia, Gray.

Branchiostegals six. Body oblong, compressed. The lower jaw projecting: the maxilla may be elongated posteriorly or truncated. Small teeth on the jaws, palatines, pterygoids, and tongue: none on the vomer. Dorsal and ventral fins absent: anal elongated. Scales rather small and deciduous. Serrature along the abominal profile developed but weak.

This genus differs from the last in having no dorsal fin. It appears that the species is more abundant along the coast of India than in the Malay Archipelago.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Raconda Russelliana*, A. 92, L. l. 64. Bay of Bengal to the Malay Archipelago.

1. Raconda Russelliana, Plate CLXIII, fig. 4.

Gray, Zool. Misc. p. 9; Cantor, Catal. p. 292; Bleeker, Atl. Ich. vi, p. 124; Jerdon, M. J. L. and Sc. 1851, p. 146.

Apterygia ramcarati, Gray and Hard. Ill. Ind. Zool.

Apterygia Hamiltonii, Cuv. and Val. xx, p. 333.
Pristigaster Russellianus, Günther, Catal. vii, p. 462.

B. vi, P. 13, A. 92($\frac{2}{90}$), C. 19, L. l. 64, L. tr. 12.

Length of head $6\frac{1}{2}$ to 7, of caudal 7, height of body $4\frac{1}{4}$ to $4\frac{1}{2}$ in the total length. *Eyes*—diameter 3 to $3\frac{1}{4}$ in length of head, 2/3 to 3/4 of a diameter from end of snout and also apart. Body strongly compressed: end of lower jaw forms a portion of the dorsal profile which is concave above the orbit, whilst the anterior portion of the abdominal profile is very convex: snout obtuse: maxilla extends to opposite the middle of the eye. *Teeth*—fine along the whole extent of the maxilla, also on the lower jaw, palate and tongue. *Fins*—upper pectoral ray enlarged, it does not extend so far as to above the root of the anal: caudal deeply forked, the lower lobe the longer. *Scales*—in regular horizontal rows, covering body and along the base of the anal fin, they are very deciduous: from 31 to 38 weak scutes along the abdominal edge. Gill-rakers nearly as long as eye and about 28 in number on the lower branch of the outer branchial arch. Pseudobranchiæ well developed. *Colours*—a narrow dark bluish band along the back, succeeded by a light bronze line, which is divided by a lighter and wider band from a broad silvery one passing from the head to the caudal fin. A deep brown or black spot exists on the shoulder, which is sometimes continued on to the opercle. The young are a beautiful purple with a silvery band.

Habitat.—Bay of Bengal to the Malay Archipelago, the young are common in the Sunderbunds.

Fourth group—Dussumieriæformes.

Mouth antero-lateral, the upper jaw not projecting. Eyes with free adipose lids, no osseous gular plate. Abdominal edge smooth.

Genus, 9—Dussumieria, *Cuvier and Valenciennes.*

Branchiostegals numerous: pseudobranchiæ well developed. Gill-membranes entirely separate. Body somewhat elongated, compressed: abdomen rounded, not serrated. Snout pointed: upper jaw not projecting: cleft of mouth of moderate width. Eyes with broad adipose lids. Small fixed teeth in the jaws, and villiform ones on the palatines, pterygoids, and on the tongue, but absent from the vomer. Dorsal fin opposite to the ventral: anal of moderate length. Scales of medium or rather small size, very deciduous. Pyloric appendages numerous.

Geographical distribution.—From Sind throughout the seas of India to the Malay Archipelago and China.

SYNOPSIS OF SPECIES.

1. *Dussumieria Hasseltii*, D. 17-20, A. 15-16, L. l. 52-56. Height of body $5\frac{2}{3}$ to $6\frac{1}{3}$ in the total length. Canara, Coromandel Coast of India to the Malay Archipelago and China.
2. *Dussumieria acuta*, D. 19-20, A. 14-17, L. l. 40-42. Height of body 5 to $5\frac{1}{4}$ in the total length. Sind, through the seas of India to the Malay Archipelago.

1. **Dussumieria Hasseltii**, Plate CLXVI, fig. 5.

Bleeker, Chiroc. p. 13, or Nat. Tyds. Ned. Ind. i, p. 422 (ex parte).
Dussumieria elopsoides, Günther, Catal. vii, p. 466 (not Bleeker).

B. xv-xix, D. 17-20($\frac{3-4}{14-16}$), P. 15, V. 8, A. 15-16($\frac{2-3}{13}$), C. 19, L. l. 52-56, L. tr. 12.

Length of head $4\frac{1}{2}$ to 5, of caudal $4\frac{1}{2}$ to 5, height of body $5\frac{2}{3}$ to $6\frac{1}{3}$ in the total length. *Eyes*—with broad adipose lids, diameter 4 to $4\frac{1}{4}$ in the length of the head, $1\frac{1}{4}$ diameters from the end of snout, and 1 apart. Snout pointed, the greatest height of the head equals its length excluding the snout. The maxilla reaches to beneath the front edge of the orbit: jaws of the same length anteriorly, or the lower slightly projecting. *Teeth*—in a single row in the jaws, also present on the tongue, palatines, and pterygoids. *Fins*—dorsal commences midway between the hind edge of the eye and the base of the caudal fin: ventral inserted beneath the last half of the dorsal. *Scales*—very deciduous. Gill-rakers rather widely set, the longest being about 1/2 as long as the eye, and 19 on the lower branch of the outer branchial arch. The branchiostegals of the left side overlap those of the right to a slight extent. *Colours*—of a beautiful green, shot with blue. Upper margin of the opercle and along the back of a light blue, below which is a bronzed line, and below that again a silvery one shot with pink. Caudal shot with blue, green, and gold. Upper surface of head and eye emerald green. Pectoral, ventral, and anal white, except the first ray of the pectoral which has a little black on it. Dorsal yellowish-green. End of snout greenish. Eyes white.

Habitat.—From Canara and the Coromandel Coast of India to the Malay Archipelago and China. The largest example obtained in Canara was 8 inches in length. It is not nearly so common as the *D. acuta.*

2. **Dussumieria acuta**, Plate CLXVI, fig. 4.

Clupea, Russell, Fish. Vizag. ii, p. 80, and *Marrawa*, pl. ccii.

Dussumieria acuta, Cuv. and Val. xx, p. 467, pl. 606; Cantor, Mal. Fish. p. 286; Bleeker, Beng. p. 72; Jerdon, M. J. L. and Sc. 1851, p. 145; Day, Fish. Malabar, p. 226; Kner, Fisch. Novara, p. 330; Günther, Catal. vii, p. 466; Bleeker, Atl. Ich. vi, p. 94, t. 271, f. 1.

Dussumieria elopsoides, Bleeker, Madura, p. 12, and Chiroc. p. 12, and Nat. Tyds. Ned. Ind. i, p. 421.

Poonduouringa, Tam.: *O-pul-dah*, Andam.

B. xiv-xv, D. 19-20($\frac{3-4}{16-17}$), P. 14, V. 8, A. 14-17($\frac{2-3}{13-14}$), C. 21, L. l. 40-42, L. tr. 11-12.

Length of head 5 to $5\frac{1}{2}$, of caudal 5, height of body 5 to $5\frac{1}{4}$ in the total length. *Eyes*—with broad adipose lids, diameter 1/4 of length of head, $1\frac{1}{4}$ diameters from the end of the snout and nearly 1 apart. Abdominal profile more convex than that of the back. Height of head equals its length excluding the snout. Snout pointed: lower jaw slightly the longer when the mouth is closed. The maxilla reaches to below the front edge of the eye. Opercle twice as high as wide. *Teeth*—in a single row in the jaws, also present on tongue and palate, but not on the vomer. *Fins*—the dorsal commences midway between the front edge of the eye and the base of the caudal fin: ventral inserted beneath the last half of the dorsal. *Scales*—very deciduous. Gill-rakers rather widely set, 1/2 as long as the eye, and about 22 in the horizontal branch of the outer branchial arch. *Colours*—the same as in *D. Hasseltii*.

Cantor says this species has been preserved *à huile*. It is termed a *Sardine* by the inhabitants and residents in Malabar, where it is very common and is excellent eating.

Habitat.—From Sind through the seas of India to the Malay Archipelago. It attains at least 7 inches in length.

Genus, 10—Spratelloides, *Bleeker*.

Branchiostegals six: pseudobranchiæ well developed. Gill-membranes entirely separated: no osseous gular plate. Body elongated, moderately compressed or sub-cylindrical: abdomen rounded. Snout compressed: the mouth anterior, having a lateral cleft: the upper jaw not overlapping the lower. Eyes without adipose lids. Teeth small and deciduous, but may be present on the jaws, vomer, pterygoids, and tongue. Dorsal fin placed opposite the ventrals: anal of moderate length or short. Scales of medium size, rather deciduous. Pyloric appendages in moderate numbers.

Geographical distribution.—Western Coast of India, Malay Archipelago to Australia, also the North Pacific.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Spratelloides Malabaricus*, D. 14, A. 18, L. l. 38, L. tr. 9. Silvery, Malabar.

1. Spratelloides Malabaricus, Plate CLXI, fig. 5.

Day, Proceedings Zoological Society, 1873, p. 240.

B. vi, D. 13-14($\frac{3}{10-11}$), P. 13, V. 8, A. 18-19($\frac{4}{14-15}$), C. 19, L. l. 38, L. tr. 9.

Length of head (its proportion increases with age) $4\frac{1}{2}$ to $5\frac{3}{4}$, of caudal $5\frac{1}{4}$, height of body $5\frac{1}{4}$ in the total length. *Eyes*—subcutaneous, diameter 1/3 of length of head, 1 diameter from the end of snout, and 3/4 of a diameter apart. Abdominal profile rather more convex than the dorsal. Lower jaw rather longer than the upper. The maxilla reaches to below the front edge or first 1/3 of the orbit. *Teeth*—minute and deciduous in both jaws. *Fins*—dorsal commences slightly anterior to the origin of the ventral, and rather nearer the end of snout than the base of the caudal fin, which latter is deeply forked. *Colours*—light yellowish-green superiorly, a silvery stripe along the side, abdomen silvery: upper caudal lobe with a bluish posterior edge: some fine black points along the back: upper edge of eye dark green.

Habitat.—Western Coast of India, in rivers and estuaries. It attains 3 inches in length, and is not uncommon.

Fifth group—Albulinæformes.

Mouth inferior and of moderate width: upper jaw projecting. Teeth in jaws.

Genus, 11—Albula, *Gronovius*.

Butyrinus, Lacép.: *Glossodus* (Cuv.) Agassiz.: *Conorhynchus* (Nozeman), Bleeker, Atl. Ich.

Branchiostegals eleven to sixteen. Gill-membranes entirely separated. Body oblong or elongated. Abdominal edge rounded and not keeled. Snout pointed, projecting beyond the mouth. Eyes with a broad annular adipose covering. Villiform teeth on the jaws, vomer, and palatine bones: granular on the tongue, pterygoid and sphenoid bones. Dorsal fin situated opposite to the ventrals: the anal shorter than the dorsal. Scales rather small, not deciduous: lateral-line present. Pseudobranchiæ well developed. Pyloric appendages numerous.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Albula conorhynchus*, D. 17-19, A. 9, L. l. 75-80. Tropical and subtropical seas.

1. Albula conorhynchus.

Albula, sp. Gronovius, Zooph. p. 102, No. 327.

Vulpes Bahamensis, Catesby, Nat. Hist. of Carol. &c. p. 1, t. i, f. 2.

Argentina glossodonta, Forsk. Desc. An. p. 68, No. 99; Bonnat. Ency. Ich. p. 177; Gmel. Linn. Syst. Nat. p. 1394.

Butirinus bonanus, Lacép. v, p. 45; Cuv. and Val. xix, p. 345.

Argentina sphyræna, Lacép. v. p. 366.

Clupea macrocephala, Lacép. v, pp. 426, 458, 460, t. xiv, f. 1.

Synodus argenteus, Bl. Schn. p. 398.

Clupea Brasiliensis, Bl. Schn. p. 427.

Albula conorhynchus and *Plumieri*, Bl. Schn. p. 432, t. 86; Cuv. and Val. xix, p. 356; Günther, Catal. vii, p. 468.

Amia immaculata, Bl. Schn. p. 451.

Esox argenteus, Forster, Desc. Anim. ed. Lichtenst. p. 196.

Engraulis sericus and *Bahiensis*, Spix, Pisc. Brasil. t. xxiii, f. 2, t. xxiv, f. 2.

Glossodus Forskalii, Agassiz in Spix, l. c. p. 49.

Butirinus glossodontus, Rüpp. N. W. Fische, p. 80, t. xx, f. 3; Schleg. Fauna Japon. Poiss. p. 242, t. cix, f. 1: Günther, Fish. Zanzibar, p. 120.

Elops (Butirinus) glossodontus, Swainson, Fishes, ii, p. 292.

Albula macrocephala, *Parræ*, *Goreensis*, *Neoguinaica*, *seminuda*, and *Forsteri*, Cuv. and Val. xix, pp. 324, 339, 342, 350, 351, 354.

Albula bananus, Cuv. and Val. xix, p. 345; Bleeker, Chiroc. p. 11; Kner, Novara Fische, p. 339.

Albula erythrocheilus, Cuv. and Val. xix, p. 352, pl. 540; Cantor, Catal. Mal. Fish. p. 283; Bleeker, enum. Pisc. p. 161.

Albula rostrata, Gronovius ed. Gray, p. 189.

Conorhynchus glossodon, Bleeker, Atl. Ich. vi, p. 83, t. 260, f. 1.

Albula glossodonta, Klunz. Fische roth. Meer. Verh. z. b. Ges. Wien. 1871, p. 602.

B. xiv-xvi, D. 17-19($\frac{3-4}{14-16}$), P. 17, V. 9-10, A. 9($\frac{3}{6}$), C. 17, L. l. 75-80, L. tr. $\frac{9-8}{11-9}$, Vert. 41/26, Cæc. pyl. 22.

Length of head $4\frac{1}{2}$ to 5, of caudal fin $4\frac{3}{4}$ to 5, height of body $5\frac{1}{2}$ to $6\frac{1}{2}$ in the total length. *Eyes*—diameter 4 to 5 in the length of the head, 1 to $1\frac{1}{3}$ diameters apart. The maxilla reaches to below the front edge of the eye. *Teeth*—generic. *Fins*—the ventral inserted beneath the last half of the dorsal. *Colours*—silvery.

Habitat.—Rea Sea, seas of Africa, India, the Malay Archipelago and America, also the Pacific.

Sixth group—ELOPSÆFORMES.

Mouth antero-lateral: lower jaw the longer. An osseous gular plate. Abdomen rounded and smooth.

Genus, 12—ELOPS, *Linnæus*.

Branchiostegals numerous: pseudobranchiæ. Gill-membranes entirely separated. Body rather elongated and compressed. An osseous gular plate is attached to the symphysis of the mandibles and covers the intermediate part. Mouth wide, anterior, lower jaw the longer. Villiform teeth in the jaws, vomer, palatine and pterygoid bones, also on the tongue and base of the skull. Ventrals opposite to the dorsal, which last has a few rays more than the anal. Scales small. Lateral-line distinct. Pyloric appendages numerous.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Elops saurus*, D. 22-24, A. 15-17, L. l. 95-100. Red Sea, seas of India to the Malay Archipelago and beyond.

Elops saurus, Plate CLXVI, fig. 1.

Elops saurus, Linn. p. 518; Bloch, t. 393, f. 1; Bl. Schn. p. 430, p. 82; Russell, Fish. Vizag. ii, p. 63, and *Inagow*, fig. 179; Dékay, New York Fauna, Fish. p. 267, pl. 41, f. 131; Cuv. and Val. xix, p. 365; Cantor, Mal. Fish. p. 287; Bleeker, Chiroc. &c. p. 14, and Atl. Ich. vi, p. 84, t. 218, f. 3; Jerdon, M. J. L. and Sc. 1851, p. 146; Gronov. ed. Gray, p. 168; Kner, Novara Fische, p. 338; Günther, Catal. vii, p. 470; Klunz. Verh. z. b. Ges. Wien, 1871, p. 603.

Argentina Carolina, Linn. Syst. Nat. p. 519; Bloch, Schn. p. 459; Lacép. v, p. 367.

Argentina machnata, Forsk. Desc. Anim. p. 68, No. 100; Gmel. Linn. p. 1395; Lacép. v, p. 366; Shaw, Zool. v, p. 129.

Elops inermis, Mitchell, Trans. Lit. and Phil. Soc. New York, i, p. 445.

Elops machnata, Cuv. Règ. Anim.; Ruppell, N. W. Fische, pp. 80, 84; Richards. Voy. Erebus and Terror, Fish. p. 59, t. 30, f. 3-5, and Ich. China, p. 310; Schleg. Fauna Japon. Poiss. p. 241, t. 109, f. 2; Day, Fish. Malabar, p. 227; Günther, Fish. Zanz. p. 121.

Elops saurus and *Indicus*, Swainson, Fishes, ii, p. 292.

Elops purpurascens, Richards. Ich. China, p. 311.

Elops Capensis, Smith, Ill. Zool. S. Africa, Fish. t. vii.

Jallugu and *Jinnagow*, Tel.: *Ullahti*, Tam.

B. xxix-xxxv, D. 22-24($\frac{4}{18-20}$), P. 19, V. 6, A. 15-17($\frac{3-4}{12-13}$), C. 19, L. l. 95-100, L. tr. 12/14.

Length of head $4\frac{1}{2}$ to 5, of caudal 5, height of body 5 in the total length. *Eyes*—diameter $4\frac{1}{2}$ to 5 in the length of head, 3/4 to 1 diameter from the end of snout, and the same apart. Body elongated, sub-fusiform; abdomen rather wide and smooth; both profiles, nearly horizontal and of almost equal curves. The under jaw slightly shorter than the upper, and rather thickened at its extremity: cleft of mouth oblique: the maxilla extends to rather behind the posterior margin of the orbit. *Teeth*—numerous and villiform in both jaws, while they are continued along the anterior edge of the maxilla: on vomer in a triangular patch, and also on the palatines where there are about ten rows. *Fins*—dorsal commences rather nearer to the base of the caudal fin than to the snout, it is highest in front with a concave upper edge: anal rather more concave than the dorsal: caudal deeply lobed in its posterior three-fourths. *Scales*—a few fine rows form a sort of sheath to dorsal and anal fins, also some over the root of caudal. *Lateral-line*—11 rows of scales between it and the base of the ventral fin. *Colours*—silvery: fins yellowish, with a greenish tinge.

Habitat.—Red Sea, East coast of Africa, through the seas of India to the Malay Archipelago and beyond. It attains a considerable length.

Genus, 13—MEGALOPS, *Commerson.*

Branchiostegals numerous: pseudobranchiæ absent. Gill-membranes entirely separated. Body oblong and compressed. Mouth anterior, lower jaw prominent. A narrow bony plate adherent to the symphysis of the mandibles, and covering the space intermediate between the two bones. Villiform teeth in the jaws, vomer, palatine, and pterygoid bones, also on the base of skull and on the tongue.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Megalops cyrinoides*, D. 19-21, A. 24-27, L. l. 37-42. East coast of Africa, seas and estuaries of India to the Malay Archipelago and beyond.

1. Megalops cyprinoides, Plate CLIX, fig. 3.

Clupea cyprinoides, Brouss. Ich. t. ix; Forst Desc. An. ed. Licht. p. 296; Bonn. Ency. Ich. p. 187, t. 75; Lacép. v, pl. 13, f. 3; Bl. Schn. p. 427; Russell, ii, p. 81, and *Kundinga*, pl. 203.

Megalops filamentosus, Lacép. v, pp. 289, 290, t. 13, f. 3; Swainson, Fishes, ii, p. 293; Bleeker, Ned. Tyds. Dierk. iii, 1866, p. 286, and Atl. Ich. vi, p. 86, t. 273; Jerdon, M. J. L. and Sc. 1849, p. 344.

Cyprinodon cundinga, Ham. Buch. pp. 254, 383.

Megalops cyprinoides. Swainson, Fishes, ii, p. 292; Günther, Catal. vii, p. 471.

Megalops setipinnis, Richardson, An. Nat. Hist. xi, p. 493, Ich. China, p. 310.

Megalops curtifilis, Richardson, Ich. China, p. 310.

Megalops Indicus, Cuv. and Val. xix, p. 388, pl. 542; Bleeker, Chiroc. p. 15; Kner, Novara Fische, p. 339.

Elops cundinga, Cantor, Catal. p. 289.

Megalops macrophthalmus, Bleeker, l. c. and Atl. Ich. vi, p. 85, t. 273, f. 2.

Megalops macropterus, *cyprinoides* and *oligolepis*, Bleeker, Ned. Tyds. Dierk. iii, 1866, p. 284.

Megalops cundinga, Jerdon, M. J. L. and Sc. 1851, p. 146; Bleeker, l. c. and Atl. Ich. vi, p. 87, t. 274, f. 1.

Elops apalike, Day, Fishes of Malabar, p. 228.

Punnikowu and *Naharn*, Ooriah: *Cunnay*, Mal.: *Moran cundai*, Tamil.: *Nga-tan-youet*, Burmese.

B. xxiv-xxvi, D. 19-21($\frac{2}{17-19}$), P. 15-16, V. 10, A. 24-27($\frac{2}{22-25}$), C. 19, L. l. 37-42, L. tr. 5-6/6.

Length of head $4\frac{1}{4}$ to 5, of caudal fin 4 to 5, height of body $4\frac{1}{2}$ to 5 in the total length. *Eyes*—with narrow adipose lids, diameter $3\frac{1}{4}$ to $3\frac{1}{2}$ in the length of head, about 1/2 a diameter from end of snout and also apart: the size of the eye in large specimens is frequently comparatively larger than in small ones. Lower jaw prominent: the maxilla reaches to opposite the hind edge of the eye. *Teeth*—villiform in both jaws, on the vomer, palatines, pterygoids, and sphenoid. *Fins*—dorsal commences opposite the ventral and about midway between the snout and base of the caudal fin, it is 2/3 as high as the body below it, its upper edge concave, and its last ray prolonged. Caudal deeply lobed, the lobes rather more expanded in the immature than in the adult fish. *Lateral-line*—each tube terminating posteriorly in 6 or 8 branches. *Colours*—summit of head dark olive, back bluish-green in the adult, lighter in the immature. Abdomen silvery, with bluish reflections. The margins of the scales of a brilliant silver, as are also the lateral-line and the sides of the head. The centre of the jaws black. Dorsal and caudal grayish, minutely dotted with black, and the margins blackish, as is also the last elongated dorsal ray. Pectoral, ventral, and anal diaphanous, with some black dots, the last anal ray dark. Eyes silvery, with the orbital margin having a dark tint. The pupils are oval pointing downwards.

Bleeker divided his eight examples of the above into 4 species, thus:—

A.—*Height of body $3\frac{2}{3}$ to $4\frac{1}{2}$ in its length. Eyes 3 to 5 in length of head.* This included *M. macropterus* with length of base of anal fin 5, of head $3\frac{1}{2}$ to 4 in that of the body; *M. filamentosus*, anal $5\frac{1}{3}$, head 4; *M. kundinga*, anal 6, head $3\frac{1}{2}$.

B.—*Height of body* $4\frac{3}{5}$ *to 5 in its length. M. cyprinoides*, with length of base of anal $5\frac{2}{3}$, of head $3\frac{1}{2}$ to $3\frac{3}{5}$ in that of the body.

Habitat.—East coast of Africa, fresh waters and estuaries of India, Ceylon, Malay Archipelago, China, and Polynesia. It is occasionally captured in rivers, but much more commonly found in tanks.

Sixth group—Chaninæformes.

Mouth anterior, transverse, small. Eyes subcutaneous. Teeth absent. Gill-membranes entirely united. Abdomen rounded and smooth.

Genus, 14—Chanos, *Lacépède.*

Lutodeira, (Kuhl), Rüppell.

Branchiostegals four: pseudobranchiæ present. Gill-membranes entirely united below and not attached to the isthmus. Body moderately elongated and compressed: abdomen rounded. An accessory branchial organ in a recess behind the true gill-cavity. Mouth small, anterior and transverse. Teeth absent. Ventral fin opposite the dorsal, which last has more rays than the anal. Caudal deeply cleft. Scales rather small. Lateral-line distinct. Air-vessel with a constriction. Pyloric appendages numerous.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Chanos salmoneus*, D. 13-16, A. 9-10, L. l. 80-90. Red Sea, seas of India to the Malay Archipelago and beyond.

2. Chanos salmoneus, Plate CLXVI, fig. 2.

Mugil chanos, Forst. Desc. Anim. p. 74, No. 110; Bonn. Ency. Ich. p. 180; Gmel. Linn. p. 1398; Bl. Schn. p. 116.

Mugil salmoneus, Bl. Schn. p. 121; Forsk. ed. Licht, p. 299.

Chanos Arabicus, Lacép. v, pp. 395, 396; Cuv. and Val. xix, p. 187.

Cyprinus, Russell, Fish. Vizag. pp. 84, 85, and *Palah bontah*, pl. 207, and *Tooleloo*, pl. 208.

Lutodeira chanos, Rüppell, Atl. p. 18, t. v, f. 1, and N. W. F. pp. 80, 84; Günther, Fish. Zanz. p. 120.

Chanos salmoneus, Cuv. and Val. xix, p. 201; Günther, Catal. vii, p. 473; Bleeker, Atl. Ich. vi, p. 81, t. 272, f. 4.

Leuciscus Zeylonicus, Benn. Proc. Zool. Soc. 1832, p. 184.

Leuciscus (Ptycholepis) salmoneus, Gray, in Dieff. Trav. New Zealand, ii, p. 218, and Ann. and Mag. N. H. xi, p. 489.

Butirinus argenteus and *Maderaspatensis*, Jerdon, M. J. L. and Sc. 1849, pp. 343, 344.

Chanos mento, *Orientalis*, *nuchalis*, and *chloropterus*, Cuv. and Val. xix, pp. 194, 195, 197; Eyd, Voy. Bon. Atl. Poiss. t. vii, f. 1; Bleeker, Chiroc. p. 11; Kner, Novara Fische, p. 341.

Chanos pala and *tolo*, Cantor, Catal. pp. 278, 282; Jerdon, M. J. L. and Sc. 1851, p. 144; Day, Fish. Malabar, p. 224.

Chanos Indicus, Bleeker, En. Pisc. Arch. Ind. p. 160.

Chanos chanos, Klunz. Fische R. M. 1871, p. 605.

Tulu candal, Tam.: *Palah bontah*, Tel.: *Hu-meen*, Canar.: *Pu-meen*, Tulu.

B. iv, D. 13-16($\frac{2-4}{11-12}$), P. 16, V. 11, A. 9-10($\frac{2-3}{7}$), C. 19, L. l. 80-90, L. tr. 12/15, Vert. 19-26.

Length of head $5\frac{1}{4}$ to $5\frac{1}{2}$, of caudal 4 to $4\frac{1}{2}$, height of body $4\frac{2}{3}$ to $5\frac{1}{4}$ in the total length. *Eyes*—subcutaneous, diameter $3\frac{1}{2}$ to $3\frac{3}{4}$ in the length of head, 3/4 to 1 diameter from the end of snout, and $1\frac{1}{4}$ apart. Body elongated: upper surface of head flat: upper jaw overhanging the lower. The maxilla extends to under the anterior margin of the orbit. Opercle nearly twice as high as wide. *Fins*—dorsal fin highest in front, its upper margin concave, and along its base are two rows of scales, it arises midway between the front edge of the eye and the base of the caudal fin. Pectoral pointed, with an elongated scaly appendage at its base: ventral inserted under the middle of the dorsal, having a long basal scale. Anal very small: the lower margin of the fin concave, with two rows of scales along its base: caudal deeply lobed, and its centre covered by two semi-lunar laminæ of scales. *Scales*—small, covering the body: there are some rows of enlarged ones over the nape. Gill-rakers short. *Colours*—summit of head and back of a brilliant glossy blue, fading into silvery on the abdomen: snout light brown. Dorsal and caudal rays grayish, which, as well as the membranes, are dotted with light brown, and both these fins are margined with black. The caudal semi-lunar laminæ of scales pale slate colour, the pectorals and ventrals white. with the anterior halves of their external surfaces minutely dotted with dark brown, their elongated appendages bright silvery. The anal white, with the anterior half dotted with black. Iris silvery, orbital half pale brownish.

Habitat.—Red Sea, seas of India to the Malay Archipelago and beyond. Attains 3 feet at least in length: is called the *milk fish* or *white mullet* by Europeans in South Canara, where Hyder Ali introduced it from the sea into tanks of fresh and brackish water where it still thrives.

FAMILY, VII—CHIROCENTRIDÆ.

Pseudobranchiæ absent. Body much elongated and compressed. Margin of upper jaw formed by the premaxillaries mesially, and the maxillaries laterally. Opercular apparatus complete. Barbels absent. A single rayed dorsal fin belonging to the caudal portion of the vertebral column. Body with thin, deciduous scales. Stomach with a blind sac: intestinal canal short.* No pyloric appendages. Air-vessel present. Branchiostegal rays 8.

Only one genus is known of this family which is confined to the Red Sea, and those of India to the Malay Archipelago. Bleeker placed this family amongst his *Clupeoidei*, and next to the group *Dussumieriformes*.

Genus, 1—CHIROCENTRUS, *Cuvier.*

Branchiostegals eight. Abdomen with a sharp but not serrated margin. Gill-membranes united for a short distance: gill-opening wide. Eyes subcutaneous. Cleft of mouth oblique and deep: the lower jaw the longer. A row of canines in the mandible, and a horizontal pair in the premaxillaries: minute teeth on the palatines, pterygoids, and tongue. A single short dorsal fin placed far backwards opposite to a long anal: an elongated osseous appendage in the axilla: ventrals very small. Scales thin, small, and deciduous. Air-vessel cellular.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Chirocentrus dorab*, D. 16-17, A. 31-36. Red Sea, seas of India to the Malay Archipelago and beyond.

1. Chirocentrus dorab, Plate CLXVI, fig. 3.

Clupea dorab, Forsk. p. 72, No. 108; Gmel. Lin. p. 1409; Russell, Fish. Vizag. ii, 78, and *Wahlah*, pl. 199; Lacép. v, p. 458.

Esox chirocentrus, Lacép. v, p. 317, t. 8, f. 1.

Clupea dentex, Bl. Schn. p. 428.

Chirocentrus dorab, Rüppell, N. W. Fische, p. 81; Cuv. and Val. xix, p. 150, pl. 565; Richard. Ich. China, p. 311; Bleeker, Chiroc. p. 10, and Atl. Ich. vi, p. 92, t. 271, f. 3; Cantor, Catal. p. 277; Jerdon, M. J. L. and Sc. 1851, p. 146.; Day, Fishes of Malabar, p. 223; Kner, Novara Fische, p. 340; Günther, Cat. vii, p. 475; Klunz. Fische Roth. Meer. Verh. z. b. Ges. Wien, 1871, p. 606.

Chirocentrus nudus, Swainson, Fishes, ii, p. 294.

Chirocentrus hypselosoma, Bleeker, Singap. p. 71, Chiroc. p. 25, and Atl. Ich. vi, p. 93, t. 269, f. 3.

Mooloo-alley and *Kiru-wahlah*, Tam.: *Wahlah*, Tel.: *Kunda*, Ooriah.

B. viii, D. 16-17($\frac{4}{12-13}$), P. 14-15, V. 6-7, A. 31-36($\frac{4}{27-32}$), C. 19.

Length of head $6\frac{1}{2}$ to $7\frac{1}{4}$, of caudal $5\frac{1}{4}$, height of body $6\frac{1}{2}$ to 9 in the total length. *Eyes*—diameter $4\frac{1}{4}$ in length of head, 1/2 of a diameter apart, and 2/3 to 1 diameter from end of snout. Upper lip terminating anteriorly in a short mesial flap. Lower jaw the longer. The maxilla reaches to below the hind edge of the eye. *Teeth*—one pair of long, sharp, straight and approximating ones exist near the centre of the premaxillaries, the remainder of which, and the whole extent of the maxilla, is armed with sharp straight teeth of irregular lengths, and becoming smaller at the posterior extremity of the jaw. Each mandible has a row of about 12 sharp laterally compressed teeth, of which the two first are the shortest, and those most anterior have an oblique anterior direction, while the posterior ones gradually become directed more and more backwards until the last form an acute angle with the jaw. Five or six large card-like teeth on the palatine bones, and a small oval group of velvety ones on the pterygoid. *Fins*—the ventral commences midway between the end of the snout and the base of the caudal: the dorsal is in about the posterior third of the body, above the anal. Along the whole extent of the lower margin of the abdomen are short hair-like rays. *Scales*—small and deciduous. *Lateral-line*—indistinctly marked. *Air-vessel*—small, elongated and cellular. *Colours*—bluish-green along the back: silvery on the sides and abdomen.

Bleeker considered the above to consist of two species, *C. dorab*, height of body 7, length of head 6 in its length without the caudal fin, and scales smaller than in *C. hypselosoma*, the latter having, height of body $5\frac{1}{2}$, length of head $5\frac{2}{3}$ in its length without the caudal fin.

Habitat.—Red Sea, through the seas of India to the Malay Archipelago and beyond. It attains at least 12 feet in length. When captured it bites at everything near it.

* The mucous membrane of the intestinal canal has been said to have *spiral folds*, a character usually attributed to the highest class of fish. Having carefully examined the anatomy of a fine specimen in a good state of preservation, I do not find this to exist. The mucous membrane is puckered into longitudinal folds, but there is no trace of a spiral one in the single example examined

FAMILY, VIII—NOTOPTERIDÆ.

Pseudobranchiæ absent. Body oblong, or more or less elongated and compressed. Tail prolonged and tapering. Margin of the upper jaw formed by the premaxillaries mesially, and the maxillaries laterally. Opercular apparatus incomplete, the subopercle being absent. A parieto-mastoid cavity on either side of the head connected with the interior of the skull. Barbels absent. Dorsal fin, if present, single, and belonging to the caudal portion of the vertebral column: ventrals rudimentary or absent: anal fin with numerous rays and confluent with the caudal. Head and body with small scales. Lateral-line present. Abdominal edge serrated anterior to the ventral fins. Stomach without any blind sac. Two pyloric appendages. Air-vessel present, and sub-divided internally. Branchiostegal rays from 3 to 9. The ova fall into the cavity of the abdomen before exclusion.

Geographical distribution.—Fresh and brackish waters of West Africa, also of the continent of India to the Malay Archipelago.

Genus, 1—NOTOPTERUS, *Lacépède.*

Mystus, sp. Ham. Buch.: *Xenomystus*, Günther.

Branchiostegals from 3 to 9. Gill-membranes partly united. Snout obtuse, convex. Muciferous channels on head well-developed. Cleft of mouth lateral. Preopercle and occasionally some of the other bones of the head serrated. Teeth in jaws, vomer, palatine and sphenoid bones, also on the tongue. Dorsal fin present (Notopterus) or absent (Xenomystus). Ventrals when present, rudimentary and united together. Air-vessel divided internally, with two horns anteriorly, which are in connection with the auditory organs: posteriorly it likewise ends in two branches which become divided from one another by the hæmal spines. Intestines short. Cæcal pylori long.

Geographical distribution.—The species without dorsal fins appear to be confined to West Africa: the remainder are Asiatic or African.

SYNOPSIS OF SPECIES.

1. *Notopterus kapirat*, A. 100-110. Scales on cheeks much larger than on body. Maxilla does not extend beyond the hind edge of orbit. India to the Malay Archipelago.
2. *Notopterus chitala*, A. 110-125. Scales on cheeks not much larger than on body. Maxilla extends far beyond hind edge of orbit. Sind and India to the Malay Archipelago.

1. Notopterus kapirat, Plate CLIX, fig. 4.

Gymnotus notopterus, Pallas, Spec. Zool. 7, p. 40, t. vi, f. 2; Bonn. Tab. Encl. p. 37, pl. 25, f. 83; Gmel. Linn. p. 1139.

Clupea sinura, Bl. Schn. p. 426.

Notopterus kapirat, Lacép. ii, p. 190; Gray, Zool. Misc. 1831, p. 16; Val. in Belanger, Voy. Ind. Or. p. 391, pl. 5, f. 1; Bleeker, Notop. p. 55, t. vi, and Atl. Ich. vi, p. 146, t. 276, f. 1; Richard. Ich. China, p. 308; Jerdon, M. J. L. and Sc. 1849, p. 343; Günther, Catal. vii, p. 480.

Mystus kapirat, Ham. Buch. Fish. Ganges, pp. 235, 382; Gray and Hard. Ill. Ind. Zool.

Mystus badjee, Sykes, Trans. Z. S. ii, p. 376, pl. 67, f. 2.

Notopterus Pallasii and *Bontianus*, Cuv. and Val. xxi, pp. 130, 147, pl. 613; Bleeker, Chiroc. p. 17.

Moh, *But* and *Purri*, Punj.: *Moh*, N.W. Prov.: *Pholoe*, Beng.: *Ambutan-wahlah* or 'Barber's knife' and *Chota wahlah*, Tam.: *Wallak-tattah*, Mysore: *Pulli* or 'a slice,' Ooriah: *Kan-doo-lee*, Assam.: *Nga-hpeh* and *Nga-phe*, Burm.

B. viii, D. 7-8($\frac{1}{6}$-$\frac{2}{7}$), P. 17, V. 5-6, A. 100-110, C. 19, L. r. 225, Vert. 15/54.

Length of head 5 to $5\frac{1}{2}$, of caudal fin 12, height of body $3\frac{1}{2}$ to 4 in the total length. *Eyes*—diameter $4\frac{1}{2}$ to 5 in the length of head, 2/3 to 1 diameter from the end of snout, and 1 apart. Dorsal profile not so convex as that of the abdomen. The maxilla reaches to below the middle of the orbit. Preorbital serrated: lower edge of preopercle with a double serrated margin. *Teeth*—an external row of strong curved ones in either jaw, with an internal finer one. Several rows of fine teeth in vomer and palate: some also present on the tongue. *Fins*—dorsal commences nearly midway between the snout and end of the caudal fin. *Scales*—those on the cheeks much larger than those on the body: about 28 serrations along the abdominal edge between the throat and the insertion of the ventral fin. *Colours*—silvery, darkest on the back: some gloss of yellow about the head. Numerous fine grayish spots everywhere. Upper surface of dorsal whitish. Eyes golden.

Habitat.—Fresh and brackish waters of India to the Malay Archipelago. Grow to 2 feet or more in length.

2. Notopterus chitala, Plate CLIX, fig. 5.

Mystus chitala, Ham. Buch. Fish. Ganges, pp. 236, 382 ; Gray and Hard. Ill. Indian Zool. (from H.B.'s MSS.)
Notopterus ornatus and *chitala*, Gray Zool. Misc. p. 16.
Notopterus maculatus, Valenc. in Belang. Voy. Ind. Or. pl. 5, f. 2.
Notopterus Buchanani, Cuv. and Val. xxi, p. 148; Bleeker, Beng. p. 149.
Notopterus hypselosoma, Bleeker, Chir. p. 27, and Atl. Ich. vi, t. 274, f. 2.
Notopterus lopis, Bleeker, Batav. p. 510, and Atl. Ich. vi, t. 275, f. 2.
Notopterus chitala, Günther, Catal. vii, p. 479 ; Bleeker, Atl. Ich. vi, p. 147.
Chitul, Ooriah : *See-tul*, Assam. : *Gundun*, Sind. : *Chitala*, Beng.

B. viii-ix, D. 9-10($\frac{1}{7}$-$\frac{2}{9}$), P. 16, V. 6, A. 110-125 (135), C. 12-14, L. l. 180, Cæc. pyl. 2.

Length of head $4\frac{1}{2}$ to 5, of caudal fin $15\frac{1}{2}$, height of body $3\frac{1}{2}$ to 4 in the total length. *Eyes*—diameter 7 to 8 in the length of head, 3/4 of a diameter from end of snout, and nearly 1 apart. Upper profile of head deeply concave. Snout rather prominent: the maxilla extends posteriorly to about the length of 1 diameter of the eye behind the hind edge of the orbit. Preorbital entire: lower edge of preopercle very finely serrated. *Teeth*—villiform in both jaws with an external enlarged row, most developed opposite centre of the upper jaw: also villiform in vomer and palatines. Some teeth likewise present on the tongue, the largest being in front. *Fins*—ventrals minute: anal and caudal confluent. *Scales*—cycloid, small, extending over body, opercles, and some of the fins: and from the nape as far as to opposite the preopercle: those on the head not being much larger than those on the body. There are about 51 serrations along the abdominal edge between the throat and the insertion of the ventral fin. *Lateral-line*—nearly straight and in upper third of the body. *Colours*—superiorly coppery-brown with about 15 transverse silvery bars joining over the back: sides silvery: fins stained with grayish spots, which are like black stars in the caudal region, placed in a single or double row close to the anal fin and sometimes extending the whole length of its base. *Air-vessel*—long, thick, with a partition down its centre, whilst posteriorly it is continued on either side of the hæmal spines, half way to the caudal fin. *Cæcal-pylori*—very long and with transverse rugæ internally: intestines short.

"The belly is uncommonly rich and well-flavoured: but the back contains numerous small bones, and a strong prejudice exists against using this fish as food, owing to its being supposed to live on human carcases."—*Ham. Buch.*

Habitat.—Fresh waters of Sind, Lower Bengal, Orissa, Assam, Burma, and Siam to the Malay Archipelago. It attains at least 4 feet in length.

FAMILY, IX—SYMBRANCHIDÆ.

Gill-openings confluent into a single slit, which is situated on the abdominal surface. Gills well developed or rudimentary. Body elongated. The humeral arch may or may not be attached to the skull. Margin of the upper jaw formed by the premaxillaries, the maxillaries being internal and parallel to them. Barbels absent. Palatine teeth, when present, in a single row or a narrow band. Vertical fins rudimentary, in the form of mere folds of skin, and no paired ones. Scales, if present, minute. Vent far behind the head. An accessory breathing sac present or absent. Air-vessel absent. Ribs present. Stomach destitute of a blind sac. No pyloric appendages. Ovaries with oviducts.

The Families *Symbranchidæ* and *Murænidæ* belong to the *Physostomi apodes* of some authors, and the former tropical family is fairly represented in the continent of India, whereas the latter is more numerous in the seas than in the fresh waters.

Geographical distribution.—Fresh and brackish waters of tropical Asia and America; also Western Australia and Van Diemen's land.

SYNOPSIS OF GENERA.

First group—AMPHIPNINA.

Humeral arch not attached to the skull: an accessory breathing apparatus. Scales present.

1. *Amphipnous.* Palatine teeth in a single row, p. 655.

Second group—SYMBRANCHINA.

Humeral arch attached to the skull. No accessory breathing apparatus. Scales absent.

2. *Monopterus.* Gills rudimentary, p. 656.
3. *Symbranchus.* Gills well-developed, p. 657.

First group—AMPHIPNINA.

Humeral arch not attached to the skull. An accessory breathing apparatus. Scales present.

Genus, I—AMPHIPNOUS. *Müller.*

Pneumabranchus, McClelland.

Branchiostegals six. Gill membranes almost entirely grown to the isthmus, and having a single transverse opening. Three branchial arches with the laminæ rudimentary, divided by narrow slits. A respiratory air sac exists on the neck behind the head communicating with the gill cavity. Palatine teeth in a single, well-developed row. Scales present and arranged in longitudinal rows.

This amphibious fish, when kept in an aquarium, may be observed to constantly rise to the surface for the purpose of respiring atmospheric air direct. It usually remains with its snout close to the surface and in like manner lies in the grassy sides of ponds and stagnant pieces of water, so that without trouble it may obtain its modicum of air. McClelland observed (Cal. Journ. Nat. Hist. v, p. 195). "I have had two live *Cuchias* by me now for a period of twelve months; they are still as well as when I first obtained them, though from an ignorance of their proper food, as well as a desire to know how long they are capable of existing without any, they had nothing to eat during that period to within the last few months, when some small fish and shrimps were put alive into the vessel."

In *Amphipnous cuchia*, we find "that of all the arches the second alone possesses laminæ for the purposes of breathing: and those consist merely of a few long fibrils attached to the middle of the arch and occupying but a very small extent of its surface: the third supports in the place of laminæ, a thick and semi-transparent tissue, which in large individuals of the species possesses a fringed or denticulated appearance on its edge; whilst the third and fourth are bare, having only the membrane that fills up the space between the arches reflected over them. The principal organs of respiration are two small bladders, which the animal has the power of filling with air, immediately derived from the atmosphere. They are placed behind the head, one on each side of the neck, above the superior or vertebral extremities of the branchial arches, and are covered over by the common integument, presenting externally when distended with air, two protuberances of a round shape. . . . . They present, when separated from their surrounding attachments and inflated with air, thin, transparent, membranous parieties, resembling the posterior portions of the lungs of a serpent. . . .

Of the whole volume of blood contained in the branchial artery, one-third passes through the gills and respiratory bladder, whilst the other two-thirds are conveyed directly from the heart to the aorta without being exposed to the action of the air." Taylor, Gleanings in Science, ii, p. 173, and Edinb. Journ. of Sc. v, 1831, p. 33; Hyrtl, Denk. Ak. Wiss. Wien, 1858, xiv, c. tab.

1. Amphipnous cuchia, Plate CLXVII, fig. 1.

Muræna, Russell, Fish. Vizag. i, p. 25 and *Dondoo Paum*, pl. 35.

Unibranchapertura cuchia, Ham. Buch. Fish. Ganges, pp. 16, 363, pl. 16, f. 4.

Amphipnous cuchia, Müller, Ak. Wiss. Berl. 1839, p. 244; Cantor, Malay. Fish. p. 338; Bleeker, Beng. p. 78; Kaup, Apodal Fish, p. 120; Günther, Catal. viii, p. 14.

Ophichthys punctatus, Swainson, Fishes, ii, p. 336.

Pneumobranchus striatus, *leprosus* (white and spotted), and *albinus* (orange yellow), McClelland, Cal. J. N. H. v, pp. 192, 195, 196, 219.

Cuchia, Ooriah and Beng.: *Nga-sheen*, Burmese.

Length of head (from gill-opening) 6 to 8 in the distance between the snout and the anus: length of tail 4 to $4\frac{1}{2}$ in the entire length. *Eyes*—two to three diameters from end of snout and situated in the anterior 1/4 or 1/5 of length of the head, about midway between the end of the snout and the posterior extremity of the jaws: a valved nostril opens above the orbit: a second, round and patent, in front of the snout. Upper jaw slightly the longer: lips fleshy. *Teeth*—a single row of small ones in the premaxillaries, except opposite the symphysis: a single band of large, curved, compressed and backwardly directed ones on either palatine: and a single row of moderately large ones on either ramus of the mandibles. *Fins*—a rudimentary dorsal commences slightly anterior to the vertical of the anus. *Scales*—distinct and longitudinally arranged. *Gill-openings*—inferior, the membrane adherent to the isthmus. Vertebræ 106/65. *Colours*—greenish, or of a chestnut-brown, becoming lighter on the abdomen: numerous black spots over the body: occasionally they are seen flesh-coloured.

One 13 inches in length in the Calcutta Museum, has the following label:—"From Seeb-Saugor, presented by S. E. Peel, Esq. This fish was hoed out of stiff blue clay as I was standing overlooking men at work, making a bund, June 24th, 1865. No water had been seen near for some time."

"Natives reject it as food and imagine that its bite is fatal to cattle, although less powerful on the human kind,—a supposition highly improbable" (Ham. Buch.).

Habitat.—Fresh and brackish waters of Punjab, extending to Bengal, Orissa, Assam and Burma. It attains at least two feet in length.

Second group—Symbranchina.

Humeral arch not attached to skull: no accessory breathing apparatus. Scales absent.

Genus, 2—Monopterus, *Lacépède.*

Fluta, Bl. Schn.; *Ophicardia*, McClelland; *Apterigia*, Basilewski.

Branchiostegals five or six. Gill-membranes almost entirely attached to the isthmus, having a single transverse opening. Three branchial arches separated by moderately wide intermediate slits, with the laminæ rudimentary or absent. Palatine teeth in a narrow band. Scales absent. No accessory breathing sac.

Dareste observed a complete absence of branchial laminæ in three examples of *Monopterus Javanensis*.

1. Monopterus Javanensis, Plate CLXIX, fig. 1.

Muræna alba, Zuiew, Nov. Act. Ac. Petrop. vii, p. 1793, p. 290, t. vii, f. 2.

Monopterus Javanensis, Lacép. ii, p. 139; Bleeker, Java, p. 22, Sym. p. 59, and Atl. Ich. iv, p. 118, t. 191, f. 1; Günther, Catal. viii, p. 14.

Unibranchapertura lævis, Lacep. v, p. 658, pl. 17, f. 3.

Monopterus Javanicus, Shaw, Zool. iv, p. 33; Cantor, Catal. p. 339, pl. v, f. 6-8; Kaup, Apod. p. 123.

Symbranchus eurychasma, Bleeker, Mur. p. 60.

Ophicardia Phayriana, McClelland, C. J. N. Hist. v, pp. 191, 218, pl. xii, f. 1.

Symbranchus grammicus, Cantor, Ann. and Mag. ix, p. 30.

Monopterus lævis, *cinereus* and *xanthognathus*, Rich. Voy. Sulphur, Ich. pp. 116, 117, 118, pl. 52, 1-7, and Ich. China, p. 315.

Monopterus marmoratus and *helvolus*, Richards, Ich. China, p. 316.

Ophicardia xanthognatha, Richards, l. c.

Apterigia saccogularis, *nigromaculata* and *immaculata*, Basilewsky, Nouv. Mém. Nat. Mosc. x, 1855, pp. 247, 248, t. 2, f. 2, and t. 8, f. 2.

Length of head 9 to 12 in the distance between the end of the snout and the vent: length of body about four or five times that of the tail. *Eyes*—situated about midway between angle of mouth and end of snout, diameter 1/8 of length of head, 2 diameters from end of snout and 1 to $1\frac{1}{2}$ apart. Greatest diameter of fish at the occiput. Profile of upper surface of the head descends somewhat suddenly from above the eyes to the snout, which last is pointed and somewhat compressed. Extent of cleft of mouth equals about 1/3 in the distance between end of snout and gill-opening. Tail narrow and tapering to a point. *Teeth*—conical, and in

a band tapering towards the angle of the mouth: the palatine band resembles those in the jaws. *Fins*—dorsal commences above or a little before the vertical from the vent. *Colours*—light-greenish, with or without dark spots; or else the whole body nearly black.

"This eel is numerous at Chusan, in streamlets, canals and estuaries. As it is a favourite article of food it is kept by the inhabitants of Chusan in large jars, with fresh water. But it is capable of living a considerable time out of water. It is of voracious habits, feeding on smaller fishes, and it takes hooks baited with earth-worms." (Cantor, l. c.)

Habitat.—This fish is confined to fresh or brackish waters of Burma, the Malay Archipelago and China.

Genus, 3—SYMBRANCHUS, *Bloch.*

Unibranchapertura, Lacépède; *Pneumabranchus* and *Ophisternon*, McClelland; *Tetrabranchus*, Bleeker.

Branchiostegals six. Gill-membranes not attached to the isthmus, having a single transverse opening. Four branchial arches with well-developed gills. Palatine teeth in a band. Scales absent. No accessory breathing sac.

Geographical distribution.—Fresh and brackish waters of India to the Malay Archipelago and Australia. Also tropical America.

1. **Symbranchus Bengalensis**, Plate CLXVII, fig. 2.

Ophisternon Bengalensis, McClelland, Cal. J. N. H. v, pp. 197, 220, t. 2, f. 1, 2; Kaup, Apod. p. 121, f. 76; Bleeker, En. Pisc. p. 179.

Symbranchus immaculatus, Cantor, Catal p. 337.

Tetrabranchus microphthalmus, Bleeker, Borneo, p. 69 (young).

Symbranchus Bengalensis, Bleeker, Atl. Ich. iv, p. 119, t. 192, f. 1; Day, Fishes Malabar, p. 251, Günther, Catal. viii, p. 16.

Length of head 9 to 12 in the distance between the end of snout and anus. *Eyes*—diameter about 1/20 of length of head. The girth of the body is equal to about three times its height. Snout anteriorly rounded, lips fleshy, the upper jaw rather the longer: cleft of mouth extending to some distance behind the orbits. *Teeth*—in upper jaw fine and pointed, and do not meet at the symphysis, those on either side terminating in a triangular patch, with a narrow edentulous interspace: those in the lower jaw rather larger, with a narrow edentulous interspace between those of each side, laterally they are in a single row: palatine teeth in a band. *Fins*—the dorsal commences before the anal, which is situated in the last fourth or fifth of the total length, the caudal is hardly conspicuous: all the fins are low. *Lateral-line*—conspicuous. *Colours*—of a dull dirty brownish red in estuaries, lightest on the abdomen. In clearer water it is greenish or blackish green, the abdomen being the lightest.

Habitat.—Estuaries and fresh waters within the influence of the tides along the coasts of India and Malay Archipelago, to the Philippines: attaining to several feet in length. It appears to be more common in Bengal than in Malabar.

Family, X— MURÆNIDÆ, *Müller*.

Body elongated, cylindrical, or band-shaped: the humeral arch not attached to the skull. The branchial openings in the pharynx may be wide or narrow slits. Margin of upper jaw constituted anteriorly by the premaxillaries, which are more or less coalescent with the vomer and ethmoid, whilst laterally the sides of the upper jaw are formed by the maxillaries which are furnished with teeth. Vertical fins, when present, confluent or separated by a projecting tail: pectorals present or absent. Scales, when present, rudimentary. Vent may be situated close to the root of the pectoral fins, or a long distance posterior to the head. The heart may be situated just, or a long distance, behind the gills. Stomach with a blind sac. No pyloric appendages. Ovaries destitute of oviducts.

Eels (*Anguilla*) have by some authors been considered as hermaphrodites. Both Syrski and Dareste have observed upon the male organs in eels, and the latter author found that the variety (*Pimpernau*) in which they were present, had female organs in some marine examples. Large sterile females ascend rivers but their ova are said not to come to maturity. Dareste also observed male organs in *Anguilla marmorata*, from the seas (?) of India.

A number of larval fishes have been termed *Leptocephali* or "glass eels." Some of them it has been suggested may be early arrested development, the fishes dying before attaining their perfect state. "To this form belong all the various *Leptocephali* and *Hyoprorus*." *L. Spallanzanii* is said by Dareste to be a young conger. "*Tilurus* is a similar form arrested in its development, but cannot be the offspring of a murænoid fish. *Stomiasunculus*, Kaup, is the young of *Stomias*; *Porobronchus*, Kaup, the young of *Fierasfer acus*; and *Esunculus*, Kaup, probably that of *Alepocephalus*."—(Günther.)

Eels are generally known as *Velangoo* or *Pamboo meen*, Tamil (snake fish).

SYNOPSIS OF GENERA.

First Group—Murænidæ platyschistæ.

Branchial openings in the pharynx are wide slits.

a.—Heart close behind gills. Tail longer or scarcely shorter than the trunk. Nostrils lateral or superior: tongue free: caudal fin continued round the end of tail: pectorals present or absent: scales present or absent.

1. *Anguilla*. Pectoral fins present: dorsal commences some distance behind the nape. Rudimentary scales, p. 659.
2. *Congromuræna*. Pectoral fins present; dorsal commences above gill-opening. Cleft of mouth reaches to below middle of eye: large muciferous cavities on skull. Teeth in bands. Scaleless, p. 660.
3. *Uroconger*. Pectoral fins present: dorsal commences above gill-opening. Cleft of mouth reaches to behind middle of eye. Maxillary teeth biserial: vomerine uniserial. Scaleless, p. 661.

b.—Heart close to gills: tail not shorter than trunk. Nostrils lateral or superior: tongue not free: caudal fin continued round the end of tail: pectorals present or absent. Scaleless.

4. *Murænesox*. Pectoral fins present. Canine teeth in jaws anteriorly: strong teeth on vomer. Posterior nostril opposite upper part or middle of eye, p. 661.
5. *Saurenchelys*. Pectoral fins absent. Posterior nostril lateral and in front of orbit, p. 663.

c.—Heart close to gills. Nostrils labial: tongue not free: caudal fin continued round the end of tail: pectorals present or absent. Scaleless.

6. *Murænichthys*. Pectoral fins absent. Body elongated, vermiform, p. 663.

d.—Heart close to gills. Nostrils labial: tongue not free: end of tail free, being without fin rays: pectorals when present rudimentary. Vomerine teeth present or absent. Scaleless.

7. *Ophichthys*. Vomerine teeth present, p. 663.

e.—Heart placed a long distance behind the gills: tail shorter than the trunk: posterior nostril in front of the eye: vertical fins little developed: pectorals, if present, rudimentary.

8. *Moringua*. Eyes small. Cleft of mouth narrow. Teeth in a single row, p. 666.

Second Group—Murænidæ engyschistæ.

Branchial openings in the pharynx are narrow slits.

9. *Muræna.* Pectorals absent: vertical fins well-developed. Posterior nostril a round and patent opening, p. 667.

10. *Gymnomuræna.* Fins absent, except a rudimentary one round end of tail, p. 674.

Bleeker divides the Murænidæ into four sub-families: Günther into two, which last I have considered as groups.

First Group—Murænidæ platyschistæ.

Branchial openings in the pharynx are wide slits.

a.—Heart close behind gills. Tail longer or scarcely shorter than the trunk. Nostrils lateral or superior. Tongue free. Caudal fin continued round the end of tail. Pectorals present or absent. Scales present or absent.

Genus, 1—Anguilla, *Cuvier.*

Muræna (sp.) Artedi: *Terpolepis* (pt.) McClelland: *Paranguilla*, Bleeker.

Gill-openings of moderate extent, situated near the base of the pectoral fins. Upper jaw not projecting beyond the lower. Teeth small and in bands. Dorsal fin commences at some distance behind the nape: pectorals present. Small scales present, which are imbedded in the skin.

Geographical distribution.—Fishes of this genus appear to be distributed in fresh waters throughout the habitable globe, being reputed to be only absent in the Arctic regions, and probably in cold districts as Turkestan.

Numerous species of this genus have been recorded and more are almost yearly being added to the present mass of synonyms. There appear to be two distinct forms in India, but they are subject to variations in the origin of the dorsal fin as regards its position in respect to the vent: and likewise, but to a minor extent, in the character of its bands of teeth, and the position of the eye. The comparative size of the bodies of these fish also varies with age and the existence of suitable food in the locality they inhabit.

Eels attain a large size in India, but not to the immense length (300 feet long) attributed to those of the Ganges by Pliny. Being seldom eaten except by the lower classes there is but little demand for them. In Java, the eel according to Bleeker, is considered by the natives to be a serpent, and they say it attacks small goats and even children. It migrates overland from one river to another when desirous of change.

SYNOPSIS OF SPECIES.

1. *Anguilla Bengalensis.* Origin of dorsal fin situated about midway in the interspace between the gill-opening and origin of anal fin. Islands in the Indian Ocean, Continents of India and Burma.

2. *Anguilla bicolor.* Origin of dorsal fin situated above, rather in front of, or slightly behind the vent. Coasts of India and the Andamans to the Malay Archipelago.

1. Anguilla Bengalensis, Plate CLXVIII, fig. .1

Muræna anguilla and *maculata*, Ham. Buch. Fish. Ganges, pp. 22, 23: Day, Fish. Mal. p. 244 (in part).

Anguilla Bengalensis, Gray and Hardw. Ill. Ind. Zool. (from H. B.'s MSS.); Günther, Catal. viii, p. 27.

Anguilla Elphinstonei, Sykes, Trans. Zool. Soc. ii, p. 377, pl. 67, f. 3; Jerdon, M. J. L. and Sc. 1849, p. 346.

Anguilla Mauritiana, Bennett, Proc. Zool. Soc. 1831, p. 113; Günther, Catal. viii, p. 25.

Anguilla labrosa, Richards. Voy. Erebus and Terror, Fish. p. 113.

Anguilla brevirostris, *variegata*, *nebulosa* and *Arracana*, McClelland, Cal. Journ. Nat. Hist. v, pp. 177, 178, 179, pl. v, f. 1 and 2, pl. vi, f. 1 and 2, pl. ix, f. 7; Bleeker, Beng. p. 153.

Anguilla marmorata, Kaup, Apod. p. 43, f. 32 (not Quoy and Gaim).

B. xii, D. 250-305, P. 18, A. 220-250, C. 10-12.

Length of head 3 to $3\frac{1}{6}$ in the distance between the snout and the vent: length of tail 3/7 more than that of the trunk. The distance between the gill-opening and the origin of the dorsal fin is 1/3 or 1/4 more than the length of the head: that between the origin of dorsal and anal fins equals the length of the head. Head rather broader than the body: snout not broad. Lower jaw prominent. Length of the cleft of the mouth equals nearly or quite 1/3 in that of the head, while it extends behind the posterior edge of the orbit, the latter being $2\frac{1}{2}$ in the length of the snout. Lips well-developed. *Teeth*—the vomerine band does not extend posteriorly so far as the maxillary one, the mandibular teeth divided by a longitudinal groove. *Fins*—pectoral equals about 2/7 of the length of head. *Colours*—brownish superiorly, becoming yellowish on the

sides and beneath: the whole of the upper surface of the body, in some examples, covered with black spots and blotches, some of which are continued on to the dorsal fin which has a light edging: anal with a dark marginal band and a light outer edging.

Anguilla Mauritiana, Bennett: *A. labrosa*, Richardson: *Muræna maculata*, Bleeker: *Anguillæ Johannæ*, Günther: *Muræna marmorata*, Kner, are terms employed for an eel, which appears to be a variety of this fish, in which the origin of the dorsal fin is only about 1/2 the length of the head before the vent.

" It is astonishing Lacépède should make such a fuss about an animal which has every appearance of a serpent, without the vivid colours, by which most of these reptiles are adorned. It is an irritable creature, swelling its head whenever angered; and constantly, when it can, buries itself in putrescent carcases," Ham. Buch.

Habitat.—Islands in the Indian Ocean, continent of India and Burma. It is common at the Andaman Islands. It probably extends its range to the Malay Archipelago, Formosa and the Pacific. It attains four feet and upwards in length and is much rarer on the hills than in the plains. Some have been introduced into the waters on the Neilgherry hills in Madras.

2. Anguilla bicolor, Plate CLXVII, fig. 3, Plate CLXVIII, fig. 2.

Muræna anguilla, Russell, Fish. Vizag. i, p. 22, t. 31.
Anguilla bicolor, McClelland, Cal. Journ. Nat. Hist. v, p. 178, t. 6, f. 1; Jerdon, M. J. L. and Sc. 1849, p. 346; Günther, Catal. viii, p. 35.
Anguilla moa, Bleeker, Java, p. 22; Kner, Novara Fische, p. 369.
Anguilla bicolor and *mowa*, Bleeker, Muræn. pp. 16, 17; Kaup, Apod. pp. 51, 53, fig. 44; Kner, Novara Fische, p. 368; Günther, Catal. viii, p. 36.
Anguilla malgumora Celebensis, Bleekeri, Malabarica and *Cantori*, Kaup, Apod. pp. 42, 52, f. 30, 31, 45, 47; Kner, l. c. p. 367.
Muræna moa, malgumora and *sidat*, Bleeker, Atl. Ich. iv, p. 10, 11, t. 146, f. 1, t. 147, f. 3, t. 148, f. 1.
Jee-tah-dah, Andamanese.

B. xii, D. 220-245, P. 18, A. 200-220, C. 10-12.

Length of head $3\frac{1}{4}$ to $3\frac{1}{2}$ in the distance between the snout and the vent: length of tail 1/4 to 1/6 more than that of the trunk. *Eye*—rather varies in size, usually about $2\frac{1}{2}$ diameters in the length of the snout. Head very slightly broader than the body: snout rather broad: lower jaw scarcely longer than the upper. Extent of cleft of mouth equal to rather above 1/3 of the length of the head, and extending to at least 1 diameter of the orbit behind the eye in the adult, to below it in the immature. Lips thick. *Teeth*—bands of nearly equal width, the vomerine reaching nearly as far backwards as those on the maxilla. *Fins*—dorsal commences above the vent or slightly before or behind it. *Colours*—of a dark olive superiorly, becoming yellowish beneath.

Dr. Günther observes that *Anguilla virescens*, Peters, from the West Coast of Africa is scarcely distinct from *A. sidat*, Bleeker.

The example figured (22 inches in length) was from the Andamans.
Habitat.—Coasts of India to the Andamans and the Malay Archipelago.

Genus, 2—Congromuræna, Kaup.

Gnathophis, Kaup: *Ophisoma* and *Ariosoma*, Swainson.
Gill-openings wide. Eyes large. Cleft of mouth not extending behind the middle of the eye. Bones in forepart of head with large mucous canals. Posterior nostril patent and opposite the middle of the front edge of the eye: the anterior nostril tubular. Teeth small and pointed forming bands, those in the jaws not constituting a cutting edge: vomerine band elongated and narrow. Dorsal fin commencing nearly opposite the gill-opening: the pectoral and also the vertical fins (which are continuous round the tail) well developed. Scaleless.

Geographical distribution.—Tropical and sub-tropical seas.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Congromuræna anago*—Vertical fins with a narrow dark edge. Coromandel coast of India to the Malay Archipelago.

1. Congromuræna anago, Plate CLXIX, fig. 2.

Conger anago, Temm. and Schleg. Fauna Japon. Poiss. p. 259, pl. 113, f. 1; Bleeker, Japon. p. 52.
Conger anagoides, Bleeker, Mur. p. 76 and Banda, p. 112.
Ophisoma anagoides, Bleeker, Atl. Ich. iv. p. 27; Kner, Novara Fische, p. 375.
Congromuræna anagoides, Bleeker, Atl. Ich. iv, t. 149, f. 3.
Congromuræna anago, Günther, Catal. viii, p. 42.

B. viii, P. 14, D. 170-196, A. 122-145, C. 10.

Length of head $2\frac{1}{2}$ to $2\frac{2}{3}$ in the distance between the end of the snout and the vent: length of trunk about 1/3 less than that of the tail. Extent of cleft of mouth equals 3 to $3\frac{1}{4}$ in the length of the head, it ceases below the middle of the eye. *Eyes*—large, diameter 1 to $1\frac{1}{4}$ in the length of snout, and 2/3 of a diameter apart. Lips rather thick: upper jaw the longer. *Teeth*—of about the same size: the vomerine band extending backwards to about 1/2 the length of the maxillary band. *Fins*—dorsal commences slightly behind the gill-opening: pectoral nearly 1/2 as long as the head. *Colours*—brownish along the back, becoming dull white beneath. Fins yellow, the vertical ones with a narrow black edging. Upper half of pectoral occasionally stained with black.

Habitat.—Coromandel coast of India to the Malay Archipelago. The example figured, which is $11\frac{1}{2}$ inches long, was from Madras.

Genus, 3—Uroconger, *Kaup.*

Congerodon, Kaup.

Gill-openings rather wide. Muciferous cavities on jaws moderately developed. Hind nostril in the form of a slit opposite the upper third of the orbit: front nostril not tubular. Eyes rather large. Cleft of mouth reaching to rather behind the middle of the orbit. Teeth fine, conical, and subequal in size: those in the jaws biserial, the vomerine ones in a single elongated row and small. Dorsal fin commences above the root of the pectoral: all the fins well-developed. Scaleless.

Geographical distribution—Seas of India to the Malay Archipelago, China, and the Philippines.

1. **Uroconger lepturus**, Plate CLXX, fig. 1.

Congrus lepturus, Richards. Voy. Sulphur, Fish. p. 106, pl. 56, fig. 1—6, and Voy. Erebus and Terror, Fish. p. 109; Bleeker, Sumatra, p. 45.

Uroconger lepturus, Kaup, Apod. p. 110; Bleeker, Atl. Ich. iv, p. 29, t. 149, fig. 1; Kner, Novara Fisch. p. 373; Günther, Catal. viii, p. 44.

B. ix, P. 10, D. 200-220, C. 10, A. 120-150.

Length of head $2\frac{1}{3}$ to $2\frac{3}{4}$ in the distance between the end of the snout and the vent: length of trunk about 1/2 that of the tail. Cleft of mouth rather oblique and ceasing below the hind edge of the eye, its extent equals about 2/5 of the length of the head. *Eyes*—diameter 2 to $2\frac{1}{4}$ in the length of the snout, and 1 to $1\frac{1}{6}$ diameters apart. Snout depressed, with a row of slit-like openings above the edge of the upper lip. *Teeth*—rather large, and unequal in size: those in the maxilla and mandible in two rows, and placed a slight distance apart, the inner row somewhat the larger: vomerine teeth in a single pointed row about equal in size to the inner maxillary row, one of the anterior teeth is sometimes enlarged. *Fins*—dorsal commences above the base of the pectoral, which latter equals about 1/4 of the length of the head. *Colours*—brownish superiorly, becoming dull white beneath: a row of white-edged glandular openings along the lateral-line. Vertical fins edged with black.

Habitat.—Seas of India to the Malay Archipelago and China.

b.—Heart close to gills. Tail not shorter than the trunk. Nostrils lateral or superior. Tongue not free. Caudal fin continued round the end of tail: pectorals present or absent. Scaleless.

Genus, 4—Murænesox, *McClelland.*

Cynoponticus, *Costa* and *Brachyconger*, Bleeker.

Gill-openings wide approximating to the abdomen. Snout rather elongated, the upper jaw the longer. Two pairs of nostrils, the posterior of which are opposite to the upper part or centre of the orbit. Teeth in the jaws rather fine, with some canines anteriorly: vomer with several rows of teeth, the middle of which are large and conical or compressed. Dorsal fin commencing above the gill-opening, it, the anal, caudal, and pectoral well developed. Anus a long distance from the gill-opening. Scaleless.

The comparative proportions of the parts in these fishes vary considerably with age, season, and food.

SYNOPSIS OF SPECIES.

1. *Murænesox telabon.* Vomerine teeth large and without basal lobes. Seas and estuaries of India to the Malay Archipelago.

2. *Murænesox telabonoides.* Vomerine teeth slender, the posterior ones with basal lobes: the external mandibular row directed outwards. Seas and estuaries of India to the Malay Archipelago.

3. *Murænesox cinereus.* Vomerine teeth large and having a basal lobe: external mandibular row not directed outwards. Red Sea, seas and estuaries of India to the Malay Archipelago.

1. **Murænesox telabon**, Plate CLXVIII, fig. 5.

Ophidium, Russell, Fish. Vizag. i, p. 27, and *Tala Bon*, pl. 38.

Conger telabon, Cuvier, Règ. An.; Cantor, Mal. Fish. p. 312; Bleeker, Singapore, p. 78 (part), Muræn. p. 18, and Borneo, p. 456; Jerdon, M. J. L. and Sc. 1851, p. 151.

Murænesox lanceolata, McClelland, Cal. J. N. H. iv, p. 409, and v, pp. 181, 210.

Murænesox exodon and *serradentata*, McClelland, Cal. J. N. H. iv, p. 409, and v, p. 210.
Murænesox telabon, Bleeker, Atl. Ich. iv, p. 22, pl. 152, f. 2; Day, Fishes Malabar, p. 246; Günther, Catal. viii, p. 45.
Culim-poun, Tel.: *Kotah* or *Kulivi-pamboo*, Tamil.

B. xvii-xix, P. 15-16, D. 270-285, C. 10, A. 195-210.

Length of head 1/3 of the distance between end of snout and vent: length of trunk about 1/4 less than that of the tail. Extent of cleft of mouth about 1/2 of length of head. *Eyes*—diameter 1/3 of length of snout, 1 diameter apart. *Teeth*—on the vomer consisting of a row of moderately large, lanceolate, widely set ones, without any basal lobes: mandibular teeth much smaller than the vomerine ones and those in the external row not directed outwards. *Fins*—dorsal commences a short distance before the base of the pectoral: the anal under about the fifty-fifth dorsal ray, just posterior to the vent. Each fin-ray arises by two distinct roots. *Colours*—upper surface of back and head olive, becoming brown posteriorly: abdomen dull white, becoming silvery inferiorly. The throat, cheeks, and gill covers with golden reflections: vertical fins with dark margins.

Habitat.—Seas of India to the Malay Archipelago: attaining ten feet or more in length.

2. Murænesox telabonoides, Plate CLXVIII, fig. 3.

Muræna myrus, Gronov. ed. Gray, p. 20.
Conger telabonoides, Bleeker, Mur. p. 20.
Murænesox exodentata, McClelland, Cal. J. N. H. v, pp. 180, 210, pl. viii, f. 4.
Murænesox pristis, Kaup, Apodal Fish. p. 116.
Murænesox telabonoides, Bleeker, Atl. Ich. iv, p. 23, t. cliv, f. 2; Günther, Catal. viii, p. 46.

B. xviii-xix, P. 15, D 245-250, C. 10, A. 200-205.

Length of head 1/3 of the distance between end of snout and vent: length of trunk rather less than that of the tail. Extent of the cleft of the mouth equals about 1/2 of the length of the head. *Eyes*—diameter $3\frac{1}{3}$ to $3\frac{3}{4}$ in the length of the snout, and 1 diameter apart. *Teeth*—the anterior ones on the vomer are straight, slender, compressed, and elongated, whilst the posterior ones have a small basal lobe in front and behind: the outer mandibular teeth are directed outwards. *Fins*—dorsal commences in advance of the base of the pectoral, the latter fin equals $3\frac{3}{4}$ in the length of the head. *Colours*—silvery becoming white on the abdomen: vertical fins yellowish, with a narrow black outer border.

Habitat.—Seas and estuaries of India to the Malay Archipelago. This is the rarest of the three forms of this genus found in India. The example figured is 36 inches in length, and from the Hooghly at Calcutta.

3. Murænesox cinereus, Plate CLXVIII, fig. 4.

Muræna cinerea, Forsk. Desc. Anim. pp. x and 22.
Muræna Arabica, Bl. Schn. p. 488.
Muræna bagio, Ham. Buch. Fish. Ganges, pp. 24, 364.
Ophisurus rostratus, Quoy and Gaim. Voy. Frey. Zool. p. 242, pl. 51, f. 1.
Conger longirostris, Bennett, Life of Raffles, p. 692.
Conger oxyrhynchus, Eyd. and Soul. Voy. Bon. i, p. 203, pl. ix, f. 2.
Murænesox tricuspidata, *Hamiltoniæ*, and *Bengalensis*, McClell. Cal. J. N. H. iv, p. 409, pl. xxiv, f. 1, a. b. and v, pp. 182, 210, pl. viii, f. 3.
Congrus tricuspidatus, Richard. Voy. Sulp. Fish. p. 105, pl. 51, f. 2 (*immature*), Ich. China, p. 312, and Voy. Erebus and Terror, Fish. p. 110.
Conger hamo, Schleg. Fauna Japon. Poiss. p. 262, pl. 114, f. 2; Richard. Voy. Ereb. and Terr. Fish. p. 111.
Conger bagio, Cantor, Catal. Malay. Fish. p. 316; Bleeker, Celebes, p. 77, and Mur. p. 22.
Congrus protervus, *angustidens* and *brevicuspis*, Richard. Ereb. and Terror, Fish. pp. 110, 111.
Murænesox bagio, Peters, Wiegm. Arch. 1855, p. 270; Kaup, Apod. p. 116, pl. xiv, f. 73; Bleeker, Atl. Ich. iv, p. 24, t. 170, f. 2; Kner, Novara Fische, p. 363.
Murænesox Singapurensis, Bleeker, Atl. Ich. iv, p. 25, t. 151, f. 2; Kner, l. c. p. 373.
Murænesox cinereus, Günther, Catal. viii, p. 46; Klunz. Verh. z. b. Ges. Wien, 1871, p. 608.

B. xx-xxii, P. 14-16, D. 230-270, C. 10, A. 190-220.

Length of head $2\frac{1}{2}$ to $2\frac{2}{3}$ times in the distance between end of snout and vent: length of trunk rather less than that of the tail. Extent of cleft of mouth equals rather less than 1/2 of the length of the head. *Eyes*—diameter $2\frac{1}{4}$ to $2\frac{1}{2}$ in the length of the snout, and 1 diameter apart. *Teeth*—the vomerine are straight, compressed, and with a basal lobe anteriorly and posteriorly: the mandibular teeth are very much smaller than the vomerine ones, and those in the external row are not bent outwards (as in *M. telabonoides*). *Fins*—dorsal commences slightly in advance of the gill-opening. The pectoral $3\frac{1}{4}$ in the length of head. *Colours*—silvery, becoming white on the abdomen: vertical fins yellowish, with either a narrow or wide outer black edge: pectoral yellow or black.

Habitat.—Red Sea, seas and estuaries of India to the Malay Archipelago and Australia. It is the most common species of the genus in the seas of India.

Genus, 5—SAURENCHELYS, *Peters.*

Gill-openings of a moderate width. Snout much produced. Nostrils lateral, the front one near the end of snout, the hind one close in front of orbit. Teeth rather small and in several rows. Pectoral fins absent: vertical fins well developed. Air-vessel and pyloric appendages absent. Scaleless.

Geographical distribution.—Coromandel coast of India (and ? Mediterranean).

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Saurenchelys Petersi.* Vertical fins with a dark edge. Sea at Madras.

1. Saurenchelys Petersi, Plate CLXVIII, fig. 6.

Length of head $2\frac{1}{4}$ times between end of snout and vent: length of trunk $3\frac{1}{2}$ times in that of the tail: extent of the cleft of the mouth 1/2 the length of the head. *Eyes*—diameter 3 in the length of the snout, and 1 diameter apart. *Teeth*—canines present anteriorly: the vomerine teeth large, compressed, but without any basal lobes. *Fins*—dorsal commences a short distance behind the gill-opening, it is low anteriorly becoming gradually more developed, and is continuous posteriorly with the anal. Pectorals absent. *Colours*—dorsal fin with a dark edge, it and the anal become almost black in the last 1/4 of their extent.

This fish appears very similar, if not identical, with *S. cancrivora*, Peters (Monat. Ak. Wiss. Berlin, 1864, p. 397), which however was believed to have been obtained from the Mediterranean.

Habitat.—The single example (figured life-size) was taken from the sea in Orissa.

c.—Heart close to gills. Nostrils labial. Tongue not free. Caudal fin continued round the end of tail: pectorals present or absent. Scaleless.

Genus, 6—MURÆNICHTHYS, *Bleeker.*

Body elongated and cylindrical. Gill-openings narrow. Eyes small. Nostrils on the edge of the upper jaw. Dorsal fin low or rudimentary, commencing a long distance posterior to the gill-opening. Pectorals absent.

Geographical distribution.—Seas of India to the Malay Archipelago.

SYNOPSIS OF SPECIES.

1. *Murœnichthys Schultzei.* Dorsal fin commences before the vent. Andamans to the Malay Archipelago.
2. *Murœnichthys vermiformis.* Dorsal fin commences behind the vent. Ceylon.

1. Murænichthys Schultzei, Plate CLXIX, fig. 3.

Murœnichthys Schultzei, Bleeker, Mur. p. 71, Visch. Batav. p. 506, Atl. Ich. iv, p. 33, t. 148, f. 3; Günther, Catal. viii, p. 52.

Length of head $2\frac{2}{3}$ to 3 in the distance between the end of the snout and the vent: length of the trunk 3/5 of that of the tail. Extent of cleft of mouth equals 1/3 of the length of the head. *Eyes*—of moderate size, situated midway between the angle of the mouth and the end of the snout. Upper jaw somewhat the longer. *Teeth*—in jaws pointed, in 3 rows, the inner the larger: the palatine teeth in two rows with obtuse crowns. *Fins*—the dorsal low, commencing in the last 1/6 of the distance between the gill-opening and the vent. Pectorals absent. *Colours*—brownish along the back, becoming of a yellowish green on the sides and below.

Habitat.—Andaman Islands to the Malay Archipelago. The single example (figured life-size) was procured at the Andamans.

2. Murænichthys vermiformis.

Chilorhinus (Murœnichthys) vermiformes, Peters, Monats. Ak. Wiss. Berl. 1866, p. 524.

Murœnichthys vermiformis, Günther, Catal. viii, p. 53.

Angle of the mouth slightly posterior to the eye. Teeth in the jaws and on the vomer in a single row. The origin of the dorsal fin behind the vent.

Habitat.—Ceylon.

d. Heart close to gills. Nostrils labial. Tongue not free. End of tail free, being without fin rays: pectorals when present rudimentary. Vomerine teeth present or absent. Scaleless.

Genus, 7—OPHICHTHYS, *Ahl.*

Ophisurus Pœcilocephalus and *Cœcilia*, Lacép.: *Cœcula*, Vahl.: *Sphagebranchus*, Bl. Schn.: *Murœnopsis*, Lesueur: *Dalophis*, Raff.: *Leptognathus*, Swainson: *Apterichthys*, Duméril: *Leptorhynchus*, Smith: *Ichthyapus*, Bris. de Barneville: *Centrurophis*, *Pœcilocephalus*, *Microdonophis*, *Cœcilophis*, *Herpetoichthys*, *Brachysomophis*,

Elapsopis, *Mystriophis*, *Echiopis*, *Scytalophis*, *Leptorhinophis*, *Pisoodonophis*, *Lamnostoma*, *Anguisurus*, *Cirrhimuraena*, *Callechelys*, *Ichthyapus*, *Ophisuraphis*, *Crotalopsis*, Kaup: *Achirophichthys*, Bleeker: *Macrodonophis* and *Uranichthys*, Poey.

Gill-openings may be close together. Snout greatly or moderately produced. Cleft of mouth wide or of medium width: lips may or may not be fringed. Teeth in jaws and on vomer, either pointed and granular, or small and conical: in the maxilla they may be in from one to four rows, or in bands; while in the mandibles they may be in one or two rows: canines present or absent. Dorsal fin, when present, commences either in advance of or nearly above the gill-opening, or behind the root of the pectoral: the pectorals, when present, may be rudimentary, or only developed in the adult, or else of moderate size: anal present or absent: extremity of tail free.

This Genus has been considered by some authors as a Family: the various Genera composing which have been included in a single but sub-divisible genus in the British Museum Catalogue, premising that in all the extremity of the tail is free, and that there are vomerine teeth.

SYNOPSIS OF SPECIES.

a. Teeth obtuse or granular: pectorals present or absent.

1. *Ophichthys boro*—Head $3\frac{1}{2}$ to 4 times in length of trunk: body nearly 2/3 of total length. Seas and estuaries of India to the Malay Archipelago: it ascends rivers.
2. *Ophichthys microcephalus*—Head $7\frac{1}{3}$ to 8 times in length of trunk: body rather above 1/3 of the total length. Malabar.
3. *Ophichthys colubrinus*—Head 8 to 9 times in length of trunk: body about 1/2 of total length. Body surrounded by brown rings, between which are sometimes spots. Andamans to the Malay Archipelago.

b. Teeth pointed and in a single row: pectorals absent.

4. *Ophichthys Orientalis*—Head $3\frac{1}{2}$ to 4 times in length of trunk: body 1/2 of total length. Ceylon and Bay of Bengal.
5. *Ophichthys ornatissimus*—Head $7\frac{1}{2}$ in length of trunk: body about as long as tail: 16 to 17 large dark spots along the lateral-line. Malabar.

a. Teeth obtuse or granular: pectorals present or absent.

1. Ophichthys boro, Plate CLXXI, fig. 2.

Ophisurus boro, *hijala* and *harancha*, Ham. Buch. Fish. Gang. pp. 20, 21, 363, t. v, f. 5; Gray, Ill. Ind. Zool. (from H. B.'s MSS.); McClell. Calc. Journ. Nat. Hist. v, p. 211, tab. 12, fig. 4; Richards. Ichth. Chin. p. 313, and Voy. Ereb. and Terr. Fish. p. 99, 102; Bleek. Beng. p. 156; Cant. Cat. Fish. p. 322, pl. 5, fig. 2 (teeth).

Ophisurus rostratus, *vermiformis*, *minimus* and *caudatus*, McClell. l. c. pp. 184, 185, 211, 212, t. 10, f. 3, and t. 12, f. 2 and 3.

Ophisurus puncticulata, *immaculata* and *acuminata*, Swainson, Fishes, ii, p. 334.

Conger microstoma, Eyd. and Soul. Voy. Bonite, i, p. 205, Poiss. pl. 9, fig. 3.

Ophisurus potamophilus, Bleek. Borneo, p. 458, and Muræn, p. 68.

Pisoodonophis boro, Kaup, Apod. p. 17; Bleek. Atl. Ichth. iv, p. 62, tab. 164, fig. 3; Day, Fish. Malabar, p. 248.

Pisoodonophis potamophilus, Kaup, Apod. p. 20; Bleek. l. c. p. 63, tab. 172, fig. 2.

Ophichthys hyala and *boro*, Günther, Catal. viii, pp. 60, 77.

B. xxix-xxxi, D. 320-400, P. 13, A. 250-270.

Length of head (to gill-opening) from $3\frac{1}{2}$ to 4 times in the distance between the snout and the vent: length of trunk nearly 2/3 of the total. *Eyes*—from 2 to $2\frac{1}{2}$ or even 3 diameters from end of snout and slightly nearer angle of mouth than the end of snout. Upper jaw the longer: cleft of mouth extending some distance behind the eye. Snout rather depressed in the young, and obtuse in the adult. *Teeth*—granular, in a large patch on maxilla, and in several smaller rows on premaxillaries: large and in several rows on the vomer. Externally two granular rows in mandible, with an internal pointed one. The form of the teeth is subject to considerable variation, thus they are usually conical in the young, which character may be retained in the adult age, *O. hyala*: or the young in some instances have globular headed teeth: the number of rows of teeth is not constant. *Fins*—dorsal low, it commences about the length of the pectoral behind its posterior margin, not quite reaching the tip of the tail. Pectoral rounded or pointed, it equals about one-fourth of the distance between the snout and its base. Anal low, it does not extend on to the tip of the tail. *Colours*—greenish-olive above with many minute black spots, becoming greenish-white below, the dorsal fin with a dark edging.

Hamilton Buchanan divided his species apparently chiefly by the colour. *O. hijala* has pale spots along the lateral-line: *O. boro* destitute of spots and wanting a lateral-line: *O. harancha*, destitute of spots but having a lateral-line.

The natives in some parts of Bengal, imagine that this fish proceeds from the ear of a porpoise.

When breathing this fish distends its gill cavities with air taken in at its mouth, whilst it can also

respire from that contained in the water. If its gill-openings are kept firmly closed, it takes in air by its mouth: should its mouth be kept shut it struggles until released so as to be able to respire. If the gills are exposed by removing the gill-membranes, it slowly moves its branchiæ, and is able to respire without taking in air by the mouth.

Habitat.—Seas and estuaries of India and Malay Archipelago, ascending large rivers to far above tidal reach. It attains to at least 24 inches inches in length.

2. Ophichthys microcephalus, Plate CLXX, fig. 2.

Length of head from $7\frac{1}{3}$ to 8 in the distance between the end of the snout and the vent: tail nearly twice as long as trunk ($1\frac{7}{9}$). *Eyes*—of moderate size, situated behind the middle of the distance between the snout and angle of the mouth. Extent of cleft of mouth from end of snout equal to $3\frac{1}{2}$ in the length of the head. Anterior tubular nostrils well-developed. *Teeth*—obtusely conical and in three rows. *Fins*—low, the dorsal commences over the last third of the pectoral fin, neither it nor the anal is continued round the end of the tail. Pectoral $3\frac{1}{4}$ to $3\frac{1}{3}$ in the length of the head. *Colours*—olive above, becoming of a dull yellow on the sides and beneath: fins externally stained with dark.

Habitat.—Three examples, none less than 25 inches in length, were captured in Malabar.

3. Ophichthys colubrinus, Plate CLXVII, fig. 4.

Muræna colubrina, Boddaert, in Pallas's Neue Nord. Beytr. ii, 1781, p. 56, pl. 2, fig. 3.

Muræna annulata and *fasciata*, Ahl, De Muræna et Ophichtho. 1789, pp. 8, 9, tab. 1, fig. 1.

Gymnothorax annulatus, *fasciatus* and *colubrinus*, Bl. Schn. pp. 527, 529.

Ophisurus fasciatus, Lacép. iv, p. 686; Richards. Ereb. and Terr. Fish. p. 100; Bleek. Atl. Ichthyol. iv, p. 64, tab. 165, fig. 1; Kner, Novara Fische, p. 379.

Ophisurus alternans, Quoy and Gaim. Voy. Uran. i, p. 243, pl. 45, fig. 2.

Ophisurus colubrinus, Richards. l. c. p. 100; Bleek. Banda, p. 106.

Ophithorax colubrina, McClell. Calc. Journ. Nat. Hist. v, p. 212 (not Synon).

Pisoodonophis fasciatus, Kaup, Apod. p. 23.

Ophichthys colubrinus, Günther, Catal. viii, p. 81: Klunz. Verh. z. b. Ges. Wien, 1871, p. 610.

"B. xxv, circ. D. 510, circ. A. 318, circ. P. 10, circ." Bleeker.

Length of head 8 to 9 times in the distance between the end of the snout and the vent: length of trunk about equal to that of the tail: snout projecting. Extent of cleft of mouth equals about 2/7 to 1/4 of the length of the head. *Eyes*—rather small, situated behind the middle of the cleft of the mouth. Snout rather pointed. *Teeth*—with rounded crowns and in two rows. *Fins*—the dorsal fin commences in front of the gill-opening just behind the nape: it and the anal are rather low: pectoral rudimentary. *Colours*—numerous (25 to 35) brown rings surround the body. In some examples a dark round spot exists in the interspace between each ring on the body.

Habitat.—Red Sea, Andamans to the Malay Archipelago, and beyond.

b.—Teeth pointed and in a single row: pectoral fins absent.

4. Ophichthys Orientalis, Plate CLXXI, fig. 1.

Muræna, Russell, Fish. Vizag. i, p. 26, and *Manti-bukaro-paumu*, pl. 37.

Dalophis Orientalis, McClelland, Cal. Journ. Nat. Hist. 1845, v, p. 213; Jerdon, M. J. Lit. and Science, 1851, p. 151.

Lamnostoma pictum, Kaup, Apodal Fish. p. 23, f. 11.

Sphagebranchus Orientalis, Kner, Novara Fische, p. 380.

Ophichthys Orientalis, Günther, Catal. viii, p. 87.

Length of head $3\frac{1}{2}$ to 4 in the distance between the end of the snout and the anus: tail as long as the trunk. *Eyes*—small, placed rather behind the middle of the length of the head. Gill-openings are longitudinal slits almost parallel one to the other. Snout projecting, extending beyond the lower jaw, and the openings of the nostrils on the lower surface. *Teeth*—pointed and in a single row. *Fins*—the dorsal commences at a short distance behind the gill-openings, it and the anal being low: pectorals absent. *Colours*—olive becoming lightest beneath: one or two rows of round whitish spots across the occiput, having a short, forward directed line of similar spots on either side.

"Very common at Madras. The boys catch it at the edge of the surf by bruising a crab in their hands and throwing it into the water, then walking about over the spot, and when they feel an eel about their feet they stoop down and suddenly dash it on to the sand with both hands. If thrown on the moist sand they burrow themselves, *tail foremost*, almost instantaneously."—(Jerdon).

Habitat.—Seas and estuaries of Ceylon and up the Bay of Bengal, certainly as high as Orissa. It attains at least a foot in length.

5. Ophichthys ornatissimus.

Herpetoichthys ornatissimus, Kaup, Apodal Fish. p. 7, f. 5.

Ophichthys ornatissimus, Day, Fish. Malabar, p. 67; Günther, Catal. viii, p. 67.

4 Q

Length of head from snout to gill-opening $7\frac{1}{2}$ in the length of the trunk: length of tail rather less than that of the trunk. Head depressed. *Eyes*—near end of snout. Jaws of nearly equal length. *Teeth*—pointed, the maxillary and front vomerine ones in a double, the remainder in a single row. *Fins*—dorsal low, commencing behind the end of the pectoral, the latter with 24 rays and about 1/4 of the length of the head. *Colours*—irregular dark spots on the head. One transverse and two longitudinal rows of white spots on the occiput: two curved whitish lines between the eye: sixteen to seventeen large, round, black spots along the lateral-line which are separated by another band of spots of different sizes. Dorsal fin with black marginal spots and stripes.

Habitat.—Malabar. An example 20·8 inches long, was obtained by Dussumier.

e.—Heart placed a long distance behind the gills. Tail shorter than the trunk. Posterior nostril in front of eye. Vertical fins little developed: pectorals, if present, rudimentary.

Genus, 8—Moringua, *Gray.*

Raitaborua, Gray: *Ptyobranchus*, McClell.; *Pterurus*, Swainson: *Aphthalmichthys*, Kaup: *Pseudomoringua*, Bleeker.

Body sub-cylindrical with the trunk considerably longer than the tail. Gill-openings rather narrow and inferior: heart far posterior to the branchiæ. Cleft of mouth narrow. The posterior nostril situated in front of the eye. Teeth in a single row. Vertical fins limited to the tail: pectorals, if present, small. Scales absent.

Geographical distribution.—Seas of India to the Malay Archipelago and Japan.

SYNOPSIS OF SPECIES.

1. *Moringua raitaborua.* Length of head 6 to $6\frac{1}{2}$ in that of the trunk: trunk longer than the tail. Estuaries of Ganges to the Malay Archipelago.

2. *Moringua macrocephala.* Length of head $5\frac{3}{4}$ in that of the trunk: trunk at least 2/3 longer than the tail. Ganges to the Malay Archipelago.

1. Moringua raitaborua, Plate CLXX, fig. 3.

Muræna raitaborua, Ham. Buch. Fish. Ganges, pp. 25, 364.

Raitaborua Hamiltonii and *Hardwickii*, Gray, Zool. Misc. p. 9, and Ill. Ind. Zool. c, fig. (from H. B. MS.)

Ptyobranchus arundinaceus, Guthrianus, erythreus, multidentata, brevis (*young*), *parvidentata, gracilis*, McClell. Calc. Journ. Nat Hist. v, pp. 200, 201, 203, 223, and pl. 9, fig. 3, 4 (*half grown*), 5 and 6, pl. 10, fig. 1 and 2.

Pterurus maculatus, Swainson, Fishes, ii, p. 334.

Anguilla (*Moringua*) *raitaborua*, Bleeker, Nat. Tyds. Ned. Ind. iv, p. 228, tab. 1.

Moringua raitaborua, Bleeker, Beng. p. 154; Kaup, Apod. p. 106; Günther, Catal. viii. p. 90.

Moringua macrochir, Bleeker, Batav. p. 71, or Atl. Ichth. iv, p. 15, pl. 147, fig. 4 (*young*); Kner, Novara Fische, p. 389.

Moringua lumbriciformis, Kaup, Apod. p. 107 (*half grown*).

Length of head from snout to gill-opening 6 to $6\frac{1}{2}$ in the distance from snout to vent: length of tail from 2/5 to 3/8 of the entire length. Height of body equals 1/3 of length of head. *Eyes*—rather high up, and 2 to 3 diameters from end of snout: jaws of equal length in front, or the lower slightly the longer. Cleft of mouth extends above 1 diameter of the orbit behind its posterior margin. Gill-opening a slit at the side of the pectoral fin. *Teeth*—in a single row directed backwards, pointed. *Fins*—dorsal slightly developed, it commences about the length of the head posterior to the anus: the anal arises a short distance behind the orifice of anus: both fins are interrupted in their middle, but posteriorly developed and join the caudal. Pectoral equals about one-sixth of its distance from the snout. *Lateral-line*—distinct. *Colours*—coppery, olive, or even purplish above, becoming silvery underneath: some black dots. Vertebræ 90 + 14.

Muræna vamos, Ham. Buch. Fish. Ganges, pp. 24, 364, may be the *Moringua linearis*, Gray, Zool. Misc. p. 9, and Gray and Hardw. Ill. Ind. Zool. and *Pachyurus linearis*, Swainson, Fishes, ii, p. 335, it is placed by Dr. Günther as a doubtful synonym of *Moringua lumbricoidea*, Richardson. McClelland, under *Ptyobranchus linearis*, C. J. N. H. v, p. 222, observes, "I suspect this species is fabricated from a drawing in the Buchanan collection, Botanical Gardens, Calcutta, in which the dorsal and anal are both represented by mistake, winding in a spiral form round the end of the tail, which has been accidentally twisted." Buchanan says of *M. vamos*, head nearly twice as wide as body. Upper jaw blunt, projecting far beyond the lower, which is sharp pointed. Nostrils tubular. Vertical fins confluent: pectorals present. Dull green above, dirty white beneath. From the estuaries of the Ganges, where it is said to attain $7\frac{1}{2}$ cubits in length.

Habitat.—Estuaries of the Ganges to the Malay Archipelago: attaining at least 22 inches in length.

2. Moringua macrocephala.

Aphthalmichthys macrocephalus, Bleeker, Ned. Tyds. Dierk. i, p. 165, and Atl. Ich. iv, p. 17, t. 147, f. 2.

Moringua macrocephala, Günther, Catal. viii, p. 92.

Length of head from snout to gill-opening $5\frac{3}{4}$ in the distance from snout to vent: trunk at least 2/3 longer than tail. Cleft of mouth about 1/5 of the length of the head. *Fins*—a few rays at the end of the tail, otherwise the vertical and pectoral fins are reduced to mere cutaneous folds.

Habitat.—India and the Malay Archipelago.

Second group—Murænidæ engyschistæ.

Branchial openings in the pharynx are narrow spots.

Genus, 9—MURÆNA, sp. *Artedi.*

Gymnothorax, Bloch: *Murænophis*, Lacép.: *Echidna*, Forst.: *Thærodontis*, *Strophidon*, and *Lycodontis*, McClell.: *Sidera*, *Eurymyctera*, *Thyrsoidea*, *Limamuræna*, *Polyuranodon*, *Pœcilophis*, *Gymnomuræna*, *Priodonophis*, and *Tæniophis*, Kaup: *Pseudomuræna*, Johnson.

Body moderately or exceedingly elongate. Gill-openings narrow. A tubular nostril on either side of the upper surface of the snout: the posterior nostril a round foramen between the eyes or opposite the antero-superior edge of the eye, it may or may not be furnished with a tube. Teeth well developed and acute or molariform: the maxillary teeth may be in one or two rows. Dorsal fin elevated or not so: the end of the tail surrounded by fin, which is occasionally rudimentary. Pectorals absent.

Geographical distribution.—Seas of tropical and temperate regions: some species ascend tidal rivers.

The dentition in some of these fishes alters considerably with age, whilst in others it is not constant in every individual of the same species.

SYNOPSIS OF INDIAN SPECIES.

A.—*Teeth pointed: the posterior nostrils not tubular.*

a.—*Tail and trunk of about the same length.*

1. *Muræna meleagris.* Teeth biserial. Black with numerous yellow dots. From East Coast of Africa and Indian Ocean to the Malay Archipelago and the Pacific.

2. *Muræna tile.* Teeth biserial. Brownish yellow with fine white spots, streaks, or marks: and which may be lost in the adult. Seas and estuaries of Bengal to the Malay Archipelago.

3. *Muræna sathete.* Teeth biserial. Greenish-olive with silvery dots along the lateral-line. Bay of Bengal to Pinang.

4. *Muræna punctata.* Teeth uniserial. Dark purplish covered with fine white spots. Coromandel coast of India.

5. *Muræna Ruppellii.* Teeth uniserial. Yellow with 18 to 20 dark bands, 3 of which are on the head. Andamans to the Malay Archipelago.

6. *Muræna reticularis.* Teeth uniserial. About 16 dark bands encircle body, none being on the head. Seas of India to China and Japan.

7. *Muræna punctatofasciata.* Teeth uniserial. From 28 to 35 more or less complete dark bands: head with dark marks. Seas of India to the Malay Archipelago.

8. *Muræna tessellata.* Teeth uniserial. Dark spots on head, body and fins, separated by narrow light lines or interspaces. East Coast of Africa, seas of India to China.

9. *Muræna fimbriata.* Teeth uniserial. Olive-brown: a few dark spots on head, and many irregular ones on body and fins. Madagascar, seas of India to the Malay Archipelago.

10. *Muræna pseudothyrsoidea.* Teeth uniserial. Brown covered with fine spots on head and body amongst which are reticulated yellow lines: a black spot usually exists at gill-opening. Sind, seas of India to the Malay Archipelago.

11. *Muræna undulata.* Teeth uniserial Light brown covered with irregular dark blotches and usually reticulated lines, most distinct in the posterior half of the body. Red Sea, East Coast of Africa, seas of India to the Pacific.

12. *Muræna flavimarginata.* Teeth uniserial: vomerine band bifurcated in front. Light brown marbled with darker: gill-opening in a black spot: fins usually with a light outer edge. Red Sea, seas of India to the Malay Archipelago.

13. *Muræna afra.* Teeth uniserial. Brownish-black or blotched. Indian Ocean to tropical parts of Atlantic.

b.—*Tail at least twice as long as trunk.*

14. *Muræna macrura.* Teeth biserial. Uniform brown, the fins nearly black. Seas of India to the Malay Archipelago.

B.—*Teeth in jaws pointed: globular on vomer.*

15. *Muræna thyrsoidea.* Teeth biserial. Light brown covered with closely set purplish spots and light intermediate lines forming a network: anal fin sometimes with a light outer edge. Andamans to the Malay Archipelago.

16. *Muræna picta.* Teeth in jaws uniserial. Gray with arborescent black markings and marbling. East Coast of Africa, seas of India to the Malay Archipelago and beyond.

C.—*Teeth generally obtuse or molariform.*

17. *Muræna zebra.* Tail 1/3 of the total length. Brown, with from 30 to 100 narrow white or yellow rings. Red Sea, East Coast of Africa to the Malay Archipelago and the Pacific.

18. *Muræna nebulosa.* Tail a little shorter than the trunk. From 20 to 25 dark blotches along the side with some white spots in the centre of each. Red Sea, Indian and Pacific Oceans.

19. *Muræna polyzona.* Tail 1/3 longer than the trunk. Brown with from 25 to 30 narrow, yellow, whole or half bands. Red Sea, Indian and Pacific Oceans.

20. *Muræna nigra.* Tail about as long as trunk. Black. Andamans.

A.—*Teeth pointed: the posterior nostrils not tubular.*

a.—Tail and trunk of about the same length.

1. Muræna meleagris.

Shaw, Nat. Misc. p. 220 and General Zool. iv, pt. i, p. 32; Richards. Voy. Erebus and Terror, Fish. p. 93; Günther, Catal. viii, p. 100.

Thyrsoidea chlorostigma and *meleagris*, Kaup, Apodal Fish, pp. 89, 91.

Muræna chlorostigma, Bleeker, Fische Java, p. 160.

Gymnothorax chlorostigma, Bleeker, Atl. Ich. iv, p. 97, t. clxxviii, f. 2.

Gymnothorax meleagris, Bleeker, Fauna Madagas. pt. iv, Poissons, p. 73.

Length of head $3\frac{1}{3}$ to $3\frac{2}{3}$ in the distance between the end of the snout and the vent: tail rather longer than the trunk. *Eyes*—small, $2\frac{1}{4}$ in the length of the snout: anterior nasal tubes very short. Length of cleft of mouth equal to $2\frac{2}{3}$ in the length of the head. The mouth can be completely closed. Gill-opening narrow. *Teeth*—in two rows, except on the vomer and side of the mandibles. Canines rather small. *Colours*—brownish-black, covered with numerous yellow dots that are smaller than the eye.

Habitat.—From the East Coast of Africa, the Seychelles and the Mauritius throughout the seas of India to the Malay Archipelago and the Pacific. It attains a large size.

2. Muræna tile, Plate CLXX, fig. 4.

Murænophis tile, Ham. Buch. Fish. Ganges, pp. 18, 363.

Strophidon literata, punctata* and *maculata*, Cal. Journ. Nat. Hist. v, pp. 186, 187, 202, 203, 215, and pl. vii, figs. 2 and 3. pl. viii, fig. 1.

Muræna vermiculata and *gracilis*, Richards. Erebus and Terror, Fish. p. 92; Bleeker, Beng. p. 78.

Muræna punctata and *literata*, Bleeker, Muræn. p. 42.

Muræna tile, Cantor, Catal. p. 331; Bleeker, Beng. pp. 78, 159, and Borneo, p. 427; Günther, Catal. viii, p. 112.

Muræna literata, Bleeker, Beng. p. 78.

Thyrsoidea tile, Kaup, Apod. p. 93, f. 66.

Gymnothorax tile, Bleeker, Atl. Ich. iv, p. 97, t. clxxviii, fig. 1, and Fauna Madagas. pt. iv, Poiss. p. 73; Kner, Novara Fische, p. 335.

Length of head $3\frac{3}{4}$ to $4\frac{1}{4}$ in the distance between the end of the snout and the vent: tail rather shorter or about the same length as the trunk. *Eyes*—rather small, about 2 to $2\frac{1}{2}$ diameters from the end of snout and situated slightly nearer the angle of the mouth than to the end of the snout: length of cleft of mouth equals about $3\frac{1}{3}$ in that of the head: anterior nasal tubes short. Gill-opening about as wide as the eye. *Teeth*—in two rows, except the lateral ones of the lower jaw: canines small. *Colours*—of a brownish yellow, or greenish, becoming lighter beneath: the body covered with small white spots, specks or marks, which sometimes have a dark border, or they may be entirely absent in adults.

McClelland remarks that *S. literata* has D. 334, A. 182; *S. punctata* D. 392, A. 190; whilst *S. maculata* is a copy of Ham. Buch. figure of *Murænophis tile*, and is probably the young of *S punctata.*

Habitat.—Bourbon, seas and estuaries of Bengal to the Malay Archipelago. It ascends tidal rivers and is common in the Hooghly at Calcutta, where it attains about 2 feet in length. The example figured was from Calcutta.

3. Muræna sathete.

Murænophis sathete, Ham. Buch. Fish. Ganges, pp. 17, 363.

Lycodontis longicaudata, McClelland, Cal. J. N. H. v, 187, pl. viii, f. 2.

Strophidon longicaudata, McClelland, l. c. p. 215.

Muræna sathete, Richards. Erebus and Terror, Fish. p. 91; Bleeker, Beng. p. 78; Cantor, Catal. p. 331; Günther, Catal. vii, p. 126.

Thyrsoidea sathete, Kaup, Apod. p. 86.

Length of head $4\frac{1}{4}$ to 5 in the distance between the end of the snout and the vent: tail rather longer (considerably says McClelland) than the trunk. *Eyes*—small, $2\frac{1}{4}$ to $2\frac{1}{2}$ diameters from the end of the snout, 2 apart, and midway between the angle of the mouth and the end of the snout. Length of the cleft of the

* Misprinted *Lycodontis*, see errata in C. J. N. H. v, p. 202.

mouth equals about $3\frac{2}{3}$ in the length of the head: jaws nearly equal in length anteriorly. *Teeth*—the maxillary, anterior vomerine and anterior mandibular teeth biserial, the rest uniserial. *Colours*—Head, body, and fins dark greenish-olive, becoming of a greenish-yellow inferiorly: silvery dots along the lateral-line.

A stuffed example 32·5 in length exists in the British Museum, which is said to belong to this species: it was presented by J. Reeves, Esq. (Kaup,) so probably came from China.

McClelland assigns D. 484, A. 394, Vertebræ 211, to this species.

Habitat.—Bay of Bengal, Pinang.

4. Muræna punctata, Plate CLXXIII, fig. 1.

Gymnothorax punctatus, Bl. Schn. p. 526.

Muræna, Russell, Fish. Vizag. i, p. 22, and *Calamaia paum*, pl. 32.

Muræna punctata, Richard. Voy. Erebus and Terror, Ich. p. 83; Bleeker, Beng. p. 78; Kaup, Apod. p. 64; Günther, Catal. viii, p. 102.

Length of head $3\frac{1}{2}$ in the distance between the end of the snout and the vent: tail rather longer than the trunk. *Eyes*—of moderate size, situated midway between the angle of the mouth and end of the snout: anterior nasal tubes about 1/2 as long as the orbit. Length of cleft of mouth equal to half the length of the head: the mouth can be completely closed. Gill-opening about twice as large as the orbit. *Teeth*—in a single row, from 18 to 22 on either side of the mandible, the anterior of which are the longest. Canines of moderate size. *Colours*—purplish black, with black streaks radiating from the eye: the whole of the fish covered with pure white spots having a dark edge, and which are largest posteriorly, but nowhere exceed the size of the pupil of the eye.

Habitat.—Coromandel Coast of India. It attains to a large size. Russell observes that it was not eaten, as it was considered to be of a poisonous nature, whilst its flesh smelt very rank even when just captured.

5. Muræna Ruppellii.

Muræna colubrina, Lacép. v, pp. 627, 641, 642, pl. xix, fig. 1 (not Boddaert); Richards. Erebus and Terror, Fish. p. 88; Bleeker, Flores, p. 335.

Muræna reticulata, Rüpp. Atl. Fische, p. 117 (not Bloch).

Dalophis Rupelliæ, McClelland, Cal. Journ. Nat. Hist. v, p. 213.

Thyrsoidea colubrina, Kaup, Apod. p. 84.

Gymnothorax reticularis, Bleeker, Atl. Ich. iv, p. 98, t. clxxvii, fig. 1, t. clxxxi, fig. 4, and t. clxxxiii, fig. 2 (not Bloch).

Muræna Ruppellii, Günther, Catal. viii, p. 104; Klunz. F. Roth. Meer. 1871, p. 615.

Length of head $3\frac{1}{3}$ to $3\frac{2}{3}$ in the distance between the end of the snout and the vent: tail about 1/5 longer than the trunk. *Eyes*—rather above 1/2 the length of the snout, and situated nearly midway between angle of mouth and end of snout: anterior nasal tubes scarcely 1/2 the length of the eye. Snout slightly compressed: extent of cleft of mouth $2\frac{2}{3}$ in the length of the head. Gill-opening about as wide as the eye. *Teeth*—in a single row (the young may have one or two extra teeth forming an inner maxillary row), from 20 to 23 in either mandible: canines of moderate size: the mouth can be completely closed. *Colours*—yellowish, with from 18 to 20 black rings encircling the head and body: they are narrower than the ground colour: the first 3 are on the head, the others sometimes become less distinct as age increases.

Habitat.—Andamans and Malay Archipelago.

6. Muræna reticularis.

Gymnothorax reticularis and *reticulatus*, Bloch, t. 416; Bl. Schn. p. 528.

Murænophis reticularis, Lacép. v, pp. 628, 642, 643.

Muræna reticulata, Richard. Erebus and Terror, Fish. p. 82; Kaup, Apod. p. 60, f. 49.

Muræna minor, Temm. and Schleg. Fauna Japon. Poiss. p. 269, t. 115, f. 2.

Priodonophis minor, Bleeker, Verh. Bat. Gen. xxvi, p. 123: Kner, Novara Fische, p. 382.

Muræna reticularis, Bleeker, Beng. p. 78; Günther, Catal. viii, p. 105.

Length of head $3\frac{1}{3}$ in the distance between the end of the snout and the vent: tail a little longer than the trunk. *Eyes*—diameter 2/3 of the length of the snout, situated rather nearer angle of mouth than end of snout. Anterior nasal tubes very short: snout short and very slightly compressed. Extent of cleft of mouth 1/3 of the length of the head. Gill-opening of about the same size as the eye. *Teeth*—in a single row, some being slightly serrated: about 13 in either mandible: the canines small, the mouth can be completely closed. *Colours*—head and back spotted and dotted with brown: about 16 dark cross bands on the body, wider than the ground colour, and most distinct in the lower half of the body and on the dorsal fin. The first well-marked ventral band is behind the gill-opening.

Habitat.—Seas of India to China and Japan.

7. Muræna punctatofasciata, Plate CLXIX, fig. 4.

Muræna catenata, Bleeker, Amboina, p. 66 (not Richard. etc.)

Gymnothorax punctato-fasciatus, Bleeker, Gymnoth. Ind. Arch. p. 167, and Atl. Ich. iv, p. 99, t. clxxv, f. 4.

Muræna punctato-fasciata, Günther, Catal. viii, p. 106.

Length of head $3\frac{3}{4}$ to $4\frac{1}{4}$ in the distance between the end of the snout and the vent: tail slightly longer than the trunk. *Eyes*—situated about midway between the end of the narrow snout and the angle of the mouth, 2/3 the length of snout. Mouth can be completely closed, the extent of its cleft equals 1/3 of the length of the head. Gill-opening about the same size as the eye. Body rather slender. *Teeth*—pointed and in a single row, without any basal lobe, occasionally there are 2 or 3 teeth forming an inner maxillary row: canines of moderate size: 16 to 17 teeth in either mandible. *Colours*—of a reddish brown, darkest along the back. From 28 to 35 dark, more or less complete rings of an irregular character on the body and fins. Head and ground colour between the rings, with blotches, spots, and fine lines.

Habitat.—Seas of India to the Malay Archipelago. The example figured was from Madras, and is 13 inches in length.

8. **Muræna tessellata**, Plate CLXXI, fig. 4.

Gymnothorax favagineus, Bloch, Schn. p. 525, t. 105.

Muræna favaginea, Cuv. Règ. Anim.

Thyrodontis reticulata, McClelland, Cal. Journ. Nat. Hist. v. pp. 188, 216, pl. 7, f. 1 (not Bl. Schn.)

Muræna tessellata and *isingteena*, Richardson, Ich. Sulphur, pp. 108, 109, t. 48, f. 1, and t. 55, f. 5-8, and Erebus and Terror, pp. 86, 88; Bleeker, Nat. Tyds. Ned. Ind. v, p. 530, and Muræn. p. 74; Günther, Catal. viii, p. 106.

Muræna python and *favaginea*, Kaup, Apodal Fish. p. 68, f. 52, 53.

Thyrsoidea tessellata and *isingteena*, Kaup, l. c. pp. 75, 76, f. 57.

Gymnothorax isingteena and *tessellatus*, Bleeker, Atl. Ich. iv, pp. 92, 93, t. clxxi, f. 3, clxxii, f. 1, and clxxxi, f. 1.

Length of head to gill-opening 3 to $3\frac{2}{3}$ in the distance between the end of the snout and the anus: tail slightly longer or shorter than the trunk. Snout compressed. *Eyes*—situated slightly before the middle of the distance between the angle of the mouth and the end of the snout. Length of cleft of mouth $2\frac{1}{3}$ to $2\frac{1}{2}$ in the distance between the end of the snout and the gill-opening. Anterior nasal tubes 1/2 as long as eye. *Teeth*—large, compressed, pointed, and in the adult in a single row, occasionally in the young a short internal row in the maxilla. *Fins*—dorsal commences above the gill-opening. *Colours*—dark polygonal or rounded spots on the head, body, and fins, which are separated by narrow light lines or interspaces; most or all of the spots are wider than the ground colour.

Habitat.—From the East Coast of Africa and the Mauritius, through the seas of India to the Malay Archipelago, and China. The example figured, which is 28 inches in length, came from Vizagapatam.

9. **Muræna fimbriata**, Plate CLXXII, fig. 1.

Bennett, Proc. Zoological Society, 1831, vol. i, p. 168; Günther, Catal. viii, p. 108.

Muræna bullata, Richards. Voy. Erebus and Terror, Fish. p. 86: Kaup, Apod. p. 81. f. 60.

Muræna isingleena, Bleeker, Sumatra, p. 277 (not Richard.)

Muræna isingleenoides, Bleeker, Mur. p. 48.

Gymnothorax isingleenoides, Bleeker, Atl. Ich. iv, p. 91, t. 180, f. 1.

Gymnothorax fimbriatus, Bleeker, Fauna Madagascar, etc., pt. iv, Poiss, p. 72.

Length of head 3 to $3\frac{1}{4}$ in the distance between the end of the snout and the vent: tail 1/3 longer than the trunk. *Eye*—rather nearer the angle of the mouth than the end of the narrow snout, from which last it is distant from $1\frac{2}{3}$ to 2 diameters. Extent of cleft of mouth equal to 1/3 of the length of the head. Gill-opening smaller than the eye. *Teeth*—pointed, and in a single row, without any basal lobe, occasionally there are 2 or 3 teeth in a second inner maxillary row. *Colours*—olive brown, with a few black spots on the head, and numerous irregularly formed ones on the body, dorsal and anal fins, many take a vertical direction, and few are larger than the eye. Fins with a white edge. In some examples the spots are in 2 or 3 regular longitudinal rows.

A fine life-size drawing of this species, $16\frac{1}{2}$ inches long, exists in Sir W. Elliot's collection, it is termed *Chuka pâm*, captured October 22nd, 1850.

Habitat.—Madagascar, Coromandel Coast of India, Andaman islands to the Malay Archipelago.

10. **Muræna pseudothyrsoidea**, Plate CLXXIII, fig. 3.

Bleeker, Celebes, p. 778, and Muræn. p. 44; Kaup, Apod. p. 65; Günther, Catal. viii, p. 112.

Gymnothorax pseudothyrsoideus, Bleeker, Atl. Ich. iv, p. 104, t. cxc, f. 2.

Length of head $3\frac{1}{2}$ to $3\frac{2}{3}$ in the distance between the end of the snout and the vent: tail a little shorter than the trunk. *Eyes*—nearer end of snout than angle of mouth, $1\frac{2}{3}$ to 2 diameters in the length of the snout, and $1\frac{1}{3}$ apart. The extent of cleft of mouth $2\frac{1}{4}$ the length of the head. The gill-opening about 1/3 wider than the eye. *Teeth*—in a single row, about 18 or 20 in either mandible, the 2 anterior being canines: canines

of moderate size, the mouth can be completely shut: one or two of anterior vomerine series, subulate and larger than those in the premaxillaries. *Colours*—brownish, covered with fine dark spots on the head and body, amongst which are reticulated yellow lines, most distinct in the caudal region. Sometimes a white edge to fins. Gill-opening usually surrounded by a black spot.

Habitat.—Coasts of Sind and India to the Malay Archipelago.

11. Muræna undulata, Plate CLXXI, fig. 5 (*young*), and CLXXIII, fig. 2 (*adult*).

Murænophis undulata, Lacép. v, pp. 629, 644.
Muræna cinerascens, Rüppell, Atl. Fisch. p. 120; Günther, Catal. viii, p. 123.
Muræna cancellata, Richards. Erebus and Terror, Fish. p. 87, pl. xlvi, fig. 1-5; Bleeker, Mur. p. 74, Sumatra, p. 531, and Batoe, p. 326.
Muræna Valenciennii, Eyd. and Soul. Voy. Bon. Poiss. p. 207, t. viii, f. 1.
Muræna Agassizi, Bleeker, Kokos, p. 458.
Thyrsoidea cancellata, Kaup, Apod. p. 76, f. 59.
Gymnothorax cancellatus, Bleeker, Atl. Ich. iv, p. 93, t. clxxvi, f. 3, and t. clxxvii, f. 2, and t. clxxxiii, fig. 1; Kner, Novara Fische, p. 384.
Gymnothorax Agassizi, Bleeker, l. c. p. 95, t. clxxxv, f. 2.
Muræna nubila, Günther, Fish. Zanz. p. 127 (not Richardson).
Muræna undulata, Günther, Catal. viii, p. 110; Klunz. F. Roth. Meer. 1871, p. 615.

Length of head $3\frac{1}{4}$ to $3\frac{1}{3}$ in the distance between the end of the snout and the vent: tail a little longer than the trunk. *Eyes*—$1\frac{3}{4}$ to 2 diameters from the end of the snout, and about midway between the angle of the mouth and the end of the snout. Length of cleft of mouth $2\frac{1}{3}$ to $2\frac{1}{2}$ in the length of the head. Gill-opening about as wide as the eye. Anterior nasal tube short. Mouth cannot be completely shut: snout pointed. *Teeth*—in a single row, occasionally one or two additional ones forming an inner row in the maxilla: normally 4 pairs of canines in the mandibles, and 18 to 20 teeth in either ramus of mandibles: 2 canines in the maxilla. *Colours*—of light brownish, covered with irregularly sized blotches, and usually light reticulated lines over the body most distinct posteriorly: no black spot at gill-opening: no white edge to fins.

Habitat.—Red Sea, East Coast of Africa, seas of India to the Malay Archipelago and Pacific Ocean. The figure on plate CLXXI, is from an example figured life-size: that on plate CLXXIII, is from an adult.

12. Muræna flavimarginata.

Rüppell, Atl. p. 119, t. xxx, f. 3; Günther, Fish. Zanzibar, p. 127, and Catal. viii, p. 119; Klunz. Fische Roth. Meer. 1871, p. 615.
? *Muræna bilineata*, Rüppell, N. W. Fische, p. 84.
Muræna pratbernon, Richards. Erebus and Terror, Fish. p. 84.
Strophidon flavimarginatus, McClelland, Cal. Journ. Nat. Hist. v, p. 214.
Muræna Batuensis and *Javanica*, Bleeker, Batoe, p. 241, and Java, p. 347.
? *Thyrsoidea grisea*, Kaup, Apod. p. 92, f. 95.
Gymnothorax Javanicus, Bleeker, Atl. Ich. iv, p. 95, t. clxxix, f. 2.
Gymnothorax flavomarginatus, Bleeker, l. c. t. clxxvi, f. 2, and t. clxxviii, f. 3, and Fauna Madagascar, pt. iv, Poissons, p. 72.

Length of head $3\frac{2}{3}$ to 4 in the distance between the end of the snout and the vent: tail rather shorter than the trunk. *Eyes*—small, from 2 to $2\frac{1}{2}$ diameters in the length of the snout, and situated about midway between the angle of the mouth and the end of the snout. Anterior nasal tubes very short: snout rather elevated. Length of cleft of mouth $2\frac{1}{2}$ in the length of the head. The mouth can be completely closed. Gill-opening wider than the eye. *Teeth*—in a single row, except the vomerine band which is bifurcated anteriorly: canines of moderate size. *Colours*—light brown or yellowish brown, marbled or spotted with darker: the head and end of tail nearly black. Gill-opening in a black spot. Fins usually with a light edge.

Klunz. Fische Roth. Meer. 1871, p. 616, considers *Muræna Javanica*, as distinct from *M. flavimarginata*.

Habitat.—Red Sea, Seychelles Archipelago, Bourbon, Mauritius, and seas of India to the Malay Archipelago.

13. Muræna afra.

Gymnothorax afer, Bloch. t. 417; Bl. Schn. p. 526.
Murænophis afra, Lacép. p. 642.
Gymnothorax funebris, Ranzani, Nov. Comm. Ac. Sc. Inst. Bonon. iv, 1840, p. 76.
Muræna lineopinnis and *prasini*, Richards. Erebus and Terror, Fish. pp. 89, 93.
Muræna Boschii and *monochrous*, Bleeker, Mur. p. 52, Sumatra, p. 103, and Ternate, p. 384.
Muræna tristis, Kaup, Apod. p. 62.

Thyrsoidea lineopinnis and *Boschii*, Kaup, Apod. pp. 82, 87.
Muræna infernalis, Poey, Mem. Cub. ii, pp. 347, 354.
Tæniophis Westphali, Kaup, Aale Hamb. Mus. Nacht. p. 1.
Gymnothorax Boschi and *monochrous*, Bleeker, Atl. Ich. iv, pp. 105, 106, t. cxc, f. 3, and t. cxci, fig. 2.
Gymnothorax Jacksoniensis, Bleeker, Verst. en Meded. Ak. Wet. Amst. xv, 1863, p. 450.
Gymnothorax infernalis, Poey, Fish. Nat. Cuba, ii, p. 258.
Muræna afra, Günther, Catal. viii, p. 123.

Length of head $3\frac{3}{4}$ in the distance between the end of the snout and the vent: tail slightly longer than the trunk. *Eyes*—diameter about 1/2 the length of the snout, and situated slightly nearer angle of the mouth than to the end of the snout. Length of cleft of mouth about $2\frac{3}{4}$ in the length of the head. Snout pointed: anterior nasal tubes about 1/2 as long as the orbit. Gill-opening not quite so wide as the eye. *Teeth*—in old examples in one row, but in the young usually in two rows in both jaws. *Colours*—a light ground, blotched and marked all over with brown, or of a general brownish black.

Habitat.—Recorded from Tranquebar (Bl. Sch.), Indian Ocean, Australia, and tropical parts of the Atlantic.

b.—Tail at least twice as long as trunk.

14. **Muræna macrura**, Plate CLXX, fig. 5.

Muræna macrurus, Bleeker, Bant. p. 324; Günther, Catal. viii, p. 127.
Thyrsoidea longissima, Kaup, Apod. p. 82.
Thyrsoidea macrurus, Bleeker, Atl. Ich. iv, p. 111, t. clxvi, f. 2; Kner, Novara Fisch. p. 386.

Length of head from snout to gill-opening, 1/4 of the distance between the end of the snout and the anus: tail from $1\frac{3}{4}$ to twice as long as the trunk. *Eyes*—situated in the front 1/2 of the distance between the angle of the mouth and the end of the snout, about 2 diameters from end of snout. *Teeth*—pointed, those in the maxilla and mandibles in two rows; canines badly developed. *Fins*—the dorsal anteriorly is low and densely enveloped in skin, it commences midway between the gape of the mouth and the gill-opening. *Colours*—uniform brown, the fins tinged with black.

The example figured was from Malabar, and is of the variety *longissima*, Kaup, which has the body comparatively longer than in *macrura*.

Habitat.—Seas of India to the Malay Archipelago. It attains upwards of 10 feet in length. This is the *Seram pambu*, Tamil, adverted to by Jerdon.

B.—*Teeth in jaws pointed: globular on vomer.*

15. **Muræna thyrsoidea**, Plate CLXXII, fig. 3.

Richards. Sulphur, Ich. p. 111, and Erebus and Terror, Fish. p. 90; Cantor, Catal. p. 330, pl. v, f. 5; Günther, Catal. viii, p. 113.
Muræna griseobadia, Richardson, Erebus and Terror, Fish. p. 89.
Muræna prosopeion, Bleeker, Sumatra, p. 300, and Muræn. p. 73.
Thyrsoidea griseobadia, *arenata* and *prosopeion*, Kaup, Apod. pp. 74, 85, 87.
Gymnothorax prosopeion, Bleeker, Atl. Ich. iv, p. 88, t. clxxxiii, f. 3.

Length of head $3\frac{1}{2}$ in the distance between the end of the snout and the vent: tail from 1/6 to 1/3 longer than the trunk. *Eyes*—$1\frac{1}{3}$ diameters from end of snout, which they are nearer to than the angle of the mouth. Anterior nasal tubes equal in length 2/3 of the vertical diameter of the eye. Length of cleft of mouth $3\frac{1}{3}$ in the length of the head. Gill-openings rather larger than the eye. *Teeth*—conical and biserial laterally on the maxilla: about 23 on either ramus of the mandibles: vomerine teeth globular and in 2 rows: no large canines: the mouth cannot be completely shut. *Fins*—dorsal more than 2/3 as high as the body. *Colours*—of a light brown covered all over with closely set purplish spots amongst which are light lines forming a net-work: gill-opening sometimes with a black mark around it: no white edge to fins. Bleeker shows a light lower edge to the anal fin.

Habitat.—Andamans to the Malay Archipelago, China and the Tonga islands. The example figured is $14\frac{1}{2}$ inches in length, and was from Port Blair.

16. **Muræna picta**, Plate CLXXII, fig. 4.

Ahl, De Mur. et Ophich. in Thunb. Diss. iii, p. 6, t. ii, f. 2; Günther, Fish. Zanz. p. 126, and Catal. viii, p. 116.

Gymnothorax pictus, Bl. Schn. p. 529; Bleeker, Atl. Ich. iv, p. 87, t. clxx, fig. 3, 4, and t. clxxii, fig. 3, and t. clxxiii, fig. 3, and clxxxix, f. 3; Kner, Novara Fische, p. 384.
Murænophis pantherinus, Lacép v, pp. 628, 641, 643.
Muræna variegata, Quoy and Gaim. Voy. Uran. Zool. p. 246, t. lii, f. 1.
Muræna lita and *siderea*, Richards. Erebus and Terror, Fish. pp. 84, 85, pl. xlviii, t. 8. f. 1-5; Bleeker, Moluk. p. 294, Mur. p. 47, and Ternate. p. 383.
Muræna Pfeifferi, Bleeker, Celebes, p. 173, and Mur. p. 72.

Sidera Pfeifferi and *pantherina*, Kaup, Apod. pp. 70, 71.
Gymnothorax pantherinus, Bleeker, Batjan, p. 152.

Length of head $3\frac{2}{3}$ in the distance between the end of the snout and the vent: tail about as long as the trunk. *Eyes*—small, about 2 diameters from the end of the snout, and situated over about the centre of the cleft of mouth, which latter is about 1/3 of the length of the head: the mouth cannot be completely closed. Anterior nasal tube not quite so long as the vertical diameter of the orbit. Gill-opening about as large as the orbit. *Teeth*—maxillary and premaxillary teeth in a single row: the vomerine ones posteriorly rounded and generally anteriorly in a bifurcated row: the anterior 2 or 3 vomerine teeth are rather curved, sharp not subulate, and about the same size as those in the premaxillaries. Mandibular teeth in one row, except anteriorly where it is double. *Colours*—there are many different forms of colour, usually of a gray or grayish-yellow groundwork covered with black spots, which are connected together by a network of dark lines causing the fish to appear marbled.

Habitat.—East coast of Africa, Madagascar, Bourbon, and seas of India to the Malay Archipelago and beyond.

C.—*Teeth generally obtuse or molariform.*

17. Muræna zebra.

Gymnomuræna zebra, Shaw, Nat. Misc. p. 101; Richards. Erebus and Terror, Fish. p. 95; Kaup, Apodal Fish. p. 104, t. 14, f. 70.
Gymnothorax zebra, Bl. Schn. p. 528.
Gymnomuræna doliata, Lacépède, v, pp. 648, 649, pl. xix, f. 4.
Muræna molendinaris, Benn. Proc. Zool. Soc. 1833, p. 32.
Muræna zebra, Cuv. Règ. Anim.: Bleeker, Boeroe, p. 80, and Amboina, p. 93; Günther, Catal. viii, p. 128; Klunz. Fische Rothen Meer. 1871, p. 620.
Gymnomuræna fasciata, Kaup, Apodal Fish, p. 103, f. 69.
Echidna zebra, Bleeker, Atl. Ich. iv, p. 81, t. clxxi, f. 1.

Length of head $6\frac{1}{2}$ to $7\frac{1}{2}$ in the distance between the end of the snout and the vent: tail 1/3 of the total length. *Eyes*—small, and rather nearer the end of the snout than to the angle of the mouth. *Teeth*—consist of bands of obtuse molars. *Colours*—of a rich dark brown, and ornamented with from 30 to 100 narrow white or yellow rings, which are sometimes incomplete.

Habitat.—Red Sea and East coast of Africa, through the seas of India to the Malay Archipelago and the Pacific. It attains a large size.

18. Muræna nebulosa, Plate CLXXII, fig. 2.

Ahl, De Mur. et Ophichth. p. 5, t. i, f. 2; Günther, Catal. viii, p. 130; Klunz. Fische Roth. Meer. 1871, p. 618.
Gymnothorax nebulosus and *echidna*, Bl. Schn. p. 528.
Echidna variegata, Forst. Desc. Anim. ed Licht. p. 181; Bleeker, Atl. Ich. iv, p. 80, t. clxviii, f. 2.
Muræna ophis, Rüpp. Atl. Fische, p. 116, t. 29, f. 2; Richard. Erebus and Terror, Fish. p. 93.
Thærodontis ophis, McClell. Cal. J. N. H. v, p. 217.
Muræna variegata, Richard. l. c. p. 94, pl. 47, fig. 11-16; Bleeker, Ich. Mol. p. 295, Mur. p. 47; Peters, Wiegm. Arch. 1855, p. 270.
Pœcilophis variegata, Kaup, Apod. p. 98, f. 67; Kner, Novara Fische, p. 381.

Length of head $4\frac{1}{2}$ to $4\frac{2}{3}$ in the distance between the end of the snout and the vent: tail a little shorter than the trunk. *Eyes*—nearly 2 diameters from end of snout and situated midway between it and cleft of mouth, which last equals about 1/3 of the length of the head. Gill-opening rather smaller than the eye. *Teeth*—most of the teeth obtuse or molariform. *Fins*—vertical ones rather well developed and commencing a little in front of gill-opening. *Colours*—brownish or olive, darkest along the back. A row of from 20 to 25 black blotches along the upper surface of the head and back extending on to the dorsal fin, and nearly as wide as the ground colour, there are some white spots in the centre of each. A similar row of blotches along the abdominal surface. Intermediate ground colour of fish covered with small black stars, spots or vermiculated lines. Vertebræ, 65/57.

This fish is termed *Saulinga Pám.* Tel. according to Sir W. Elliot.

Habitat.—Red Sea, Madagascar, Bourbon, Seychelles Archipelago, through the Indian and Pacific Oceans. It is said to attain 5 feet in length.

19. Muræna polyzona, Plate CLXIX, fig. 3.

Richards. Voy. Sulphur, Zool. p. 112, pl. lv, f. 11-14, and Erebus and Terror, Fish. p. 95; Bleeker, Manado, p. 73; Jerdon, M. J. L. and Sc. 1851, p. 151; Günther, Catal. viii, p. 129; Klunz. Fisch. Roth. Meer. 1871, p. 617.
Muræna dizona, Bleeker, Timor, p. 260.
Pœcilophis polyzonus, Kaup, Apod. p. 101; Kner, Novara Fische, p. 382.
Echidna polyzona, Bleeker, Atl. Ich. iv, p. 81, t. clxviii, f. 3.

Length of head 1/4 of the distance between the end of the snout and the vent: tail about 1/3 longer than body. *Eyes*—of moderate size, placed about midway between angle of mouth and end of the snout. Length of cleft of mouth $3\frac{1}{2}$ in the length of the head. Gill-opening small, scarcely so large as the eye. *Teeth*—with rounded crowns, the form changing considerably with age. *Fins*—dorsal rudimentary, commencing a little behind the vertical from the branchial opening. *Colours*—deep brown, encircled with fine narrow, 25-30 (yellow) whole or half bands, which usually increase in width as they descend.

A beautiful figure, $17\frac{1}{2}$ inches in length, marked, *Búdidé pám*, natural size, exists in Sir W. Elliot's collection of drawings of Madras fish.

Habitat.—Red Sea, through the seas of India to the Malay Archipelago and the Pacific.

20. **Muræna nigra**, Plate CLXXI, fig. 3.

Day, Proc. Zool. Soc. 1870, p. 702.

Length of head $4\frac{1}{2}$ in the distance between the end of the snout and the vent: tail nearly 1/2 of the total length. *Eyes*—situated nearer to the snout than to the angle of the mouth, small, diameter half that of the snout: anterior tubular nostril of moderate length. Gill-opening about as wide as the eye. Cleft of mouth equals 1/3 of length of the head: the mouth cannot be completely closed. *Teeth*—biserial, except in the mandible where there are three rows in some places, all are obtuse except the inner maxillary row, which are pointed and finer than the outer row: premaxillary and vomerine teeth of equal size and with globular heads: mandibles with about 20 teeth in either side. *Fins*—dorsal and anal moderately developed: the former commencing just behind a vertical line from the gill-opening, and half as high as the body. *Colours*—uniform black, no light edge to the fins.

Habitat.—Andamans. This specimen, 16 inches long, was discovered alive under a large stone at low water at Port Blair.

Genus 10—Gymnomuræna, *Lacépède.*

Murænoblenna, Lacép.; *Ichthyophis*, Lesson: *Uropterygius*, Rüpp.: *Channomuræna*, Richardson.

Gill-openings of moderate width or narrow. Two pairs of nostrils on the upper surface of the snout, the posterior being a round foramen, or with a short tube. Teeth small, pointed, and numerous. Fins absent except a rudimentary one round the end of the tail. Scales absent.

Geographical distribution.—Indian and Pacific Oceans.

SYNOPSIS OF SPECIES.

1. *Gymnomuræna tigrina*—Tail nearly twice as long as trunk. Brownish, with dark blotches. East coast of Africa, seas of India to the Malay Archipelago and beyond.
2. *Gymnomuræna marmorata*—Tail rather longer than trunk. Gray marbled with arborescent dark lines. Andamans to the Malay Archipelago.

1. **Gymnomuræna tigrina.**

Ichthyophis tigrinus, Lesson, Mém. Soc. d'Hist. Nat. Paris, iv, p. 399, and Voy. Coq. Zool. ii, p. 129, Atl. Poiss. t. xii,: Swainson, Fishes, ii, p. 336; Richard. Erebus and Terror, Fish. p. 96; Bleeker, Ichthyoph. p. 463.

Murænoblenna tigrina, Bleeker, Amboina, p. 93.

Gymnomuræna tigrina, Bleeker, Atl. Ich. iv, p. 113, t. clxv, f. 3; Kner, Novara Fische, p. 307; Günther, Catal. viii, p. 133.

Length of head $4\frac{1}{4}$ in the distance between the end of the snout and the vent: tail nearly twice as long as the body. *Eyes*—small. Posterior nostril slightly tubular in the adult. Extent of cleft of mouth $2\frac{1}{3}$ in the length of the head. *Teeth*—no distinct canines: the maxillary and anterior mandibular ones in two rows. *Colours*—brownish, with various sized irregularly shaped or rounded black spots and blotches.

Habitat.—East coast of Africa, seas of India to the Malay Archipelago and beyond. There is an example in the British Museum from the Mauritius, 4 feet in length.

2. **Gymnomuræna marmorata**, Plate CLXXII, fig. 5.

Lacép. v, pp. 648, 650; Günther, Catal. viii, p. 133.

Ichthyophis pantherinus, Less. Voy. Coq. Poiss. ii, p. 131, Atl. t. xiii; Swainson, Fishes, ii, p. 336; Bleeker, Ichthyoph. p. 464.

Gymnomuræna pantherina, Bleeker, Atl. Ich. iv, p. 113, t. clxxv, f. 3.

Muræna micropterus, Bleeker, Moluk. p. 298, and Mur. p. 50 *(young)*.

Uropterygius xanthopterus, Bleeker, Java, p. 350 *(young)*.

Gymnomuræna macrocephalus, Bleeker, Mur. p. 54, and Atl. Ich. iv, p. 114, t. 165, f. 2 *(young)*.

Gymnomuræna xanthopterus and *micropterus*, Bleeker, Atl. Ich. iv, p. 114, 115, t. 184, f. 4, and 164, fig. 2; Kner, Novara Fische, p. 388.

Length of head 4 to $4\frac{1}{2}$ in the distance between the end of the snout and the vent: tail rather longer than the trunk. *Eyes*—small, about $1\frac{1}{2}$ or $1\frac{2}{3}$ diameters from end of snout, to which it is nearer than to the angle of the mouth. Extent of cleft of mouth equal from $2\frac{1}{2}$ to $2\frac{3}{4}$ in the length of the head. The gill-opening wider than the eye. Anterior nasal tubes short, the posterior nostrils with a raised edge in adults. *Teeth*—pointed, in a band in either jaw, the inner row the larger: no large canines: in a single row in vomer, the anterior two of which are rather enlarged and acicular. *Fins*—the vertical fins only exist round the end of the tail, the fin rays being rudimentary. *Colours*—of a brownish gray marbled all over with arborescent dark lines. The variety *G. xanthopterus* has the fins yellow.

Habitat.—Andamans to the Malay Archipelago. The example figured is 10·3 inches in length.

Order, IV—LOPHOBRANCHII, *Cuvier.*

Fishes having a dermal, segmental skeleton, with the opercular pieces reduced to a single plate. Gill-openings small: gills consisting of small rounded tufts attached to the branchial arches. Muscular system very slightly developed. Snout produced: mouth terminal, but small. Teeth absent. Air-vessel stated to be destitute of a pneumatic duct.

The fishes which comprise this order normally swim in a vertical position, the dorsal fin being the principal propeller, and which while in motion it rapidly undulates from end to end.

As respects the mode of propagating their species, Professor Canestrini considered a coitus occurs, when the ova are transferred from the female to the male, the latter fecundating them after they have entered the ovigerous sac. Kaup remarked that "in most of the species the males perform the function of hatching the eggs, which for that purpose are deposited up to the time of the evolution of the young, either between the ventrals *(Solenostomus)*, or in tail pouches *(Hippocampus)*, or in pouches on the breast and belly *(Doryrhamphus)*, or in rows on the breast and belly *(Nerophis)*, and are thus carried about by the fish." Dr. Günther, in his observations on *Solenostoma cyanopterum*, remarks, "Kaup states that in the males of *Solenostoma paradoxum* the egg pouch is formed by the union of the inner edge of the ventrals to the skin of the belly, and that in the females the ventrals are free as in other fish. All the specimens from Zanzibar which have been examined have the ventrals attached to the skin of the belly, and *all* of them are *females*: so that if the first part of Dr. Kaup's remarks prove to be true, both sexes in this species carry eggs. We may state that we have ascertained by dissection that specimens having eggs in the ventral pouch have at the same time ova in the ovaries scarcely less developed than those in the pouch."—(Fish. Zanz. p. 138.)

Fishes of this Order have been divided into two Families:—

Syngnathidæ, with small gill-openings: one dorsal fin: no ventral; and some of the other fins may be absent.

Solenostomidæ, with wide gill-openings: two dorsal fins; and the fins well-developed.

Family, I—SYNGNATHIDÆ, *Kaup.*

Gill-openings small, round, and situated at the posterior superior angle of the gill-cover. A single dorsal fin. Ventrals, and occasionally one or more of the other fins, absent.

SYNOPSIS OF INDIAN GENERA.

First group—Syngnathina.

Tail not prehensile: caudal fin usually present.

A.—*Humeral bones united: male with egg-pouch on tail: a caudal fin.*

1. *Syngnathus.* Dorsal ridges of trunk and tail not continuous: dorsal fin opposite, or nearly so, to the vent: pectorals well developed, p. 677.
2. *Ichthyocampus.* Dorsal ridges of trunk and tail continuous when distinct: dorsal fin opposite, or nearly so, to the vent: pectorals present, p. 679.

B.—*Humeral bones united: male with egg-pouch on abdomen: pectoral and caudal fins absent.*

3. *Doryichthys.* Ridges on body very distinct: caudal fin not very long, p. 679.

C.—*Male with ova attached to the abdomen and no closed pouch: pectorals absent: caudal, when present, rudimentary.*

4. *Nerophis.* No adipose fins, p. 680.

Second group—Hippocampina.

Tail prehensile: caudal fin absent.

5. *Gastrotokeus.* Body depressed, p. 681.
6. *Acentronura.* Body compressed: occipital crest without a coronet, p. 681.
7. *Hippocampus.* Body compressed: occipital crest with a coronet, p. 681.

First group—SYNGNATHINA.

Tail not prehensile: caudal fin usually present.

A.—*Humeral bones united: male with egg-pouch on tail: a caudal fin.*

Genus, 1—SYNGNATHUS, *Artedi.*

Corythoichthys, Trachyrhamphus, and *Halicampus*, Kaup.

Body with more or less distinct ridges: the dorsal edge of the trunk not being continuous with that on its caudal portion: humeral bones firmly united into the breast ring. The opercle may be entirely crossed by a distinct ridge, or it may be only at its base, or the ridge absent. Dorsal fin either opposite or nearly so to the vent: its base may be raised or not so: pectorals well developed: caudal present. An egg-pouch on the tail of the males, the eggs being covered by cutaneous folds.

Geographical distribution.—Tropical and temperate seas, some entering fresh waters.

SYNOPSIS OF INDIAN SPECIES.

A.—*Bony ridge on opercle, when present, only along its base: base of dorsal fin elevated.*

1. *Syngnathus serratus*, D. 25-27, Rings 21-25 + 45-47, Trunk 1/2 to 2/3 of total length. Snout less than 1/2 of length of head, and with a serrated crest. Body banded. Seas of India to China.
2. *Syngnathus longirostris*, D. 27, Rings 23 + 49? Snout more than 1/2 length of head and without a serrated crest. Body banded. Ceylon and Madras to China.
3. *Syngnathus intermedius*, D. 28, Rings 24-25 + 48-49. Snout 1/2 as long as head and without any crest. Body banded: dorsal fin spotted. Madras.

B.—*A bony ridge entirely crossing the opercle.*

4. *Syngnathus spicifer*, D. 23-27, Rings 15-16 + 39-42. Trunk 2/5 of the total length. Dark spots on lower jaw: body and dorsal fin barred. Seas, estuaries, and fresh waters, from the Red Sea and East coast of Africa through the seas of India to the Malay Archipelago.
5. *Syngnathus cyanospilos*, D. 20-23, Rings 12-15 + 33-35. Body banded, each crossbar with a white posterior edge. East coast of Africa, seas of India to the Malay Archipelago.

A.—*Bony ridge on opercle, when present, only at its base: base of dorsal fin elevated.*

1. Syngnathus serratus, Plate CLXXIII, fig. 4.

Syngnathus typle, Russell, Fish. Vizag. i, p. 21 (not Linn.) and *Goorahpoo subbookoo*, pl. 30, f. 2.
Syngnathus serratus, Schleg. Faun. Japon. Poiss. p. 272, pl. 120, fig. 4; Bleeker, Japan, p. 55; Günther, Catal. viii, p. 167.
Syngnathus subbookoo, Bleeker, Beng. p. 80.
Trachyrhamphus serratus, Kaup, Lophobr. p. 23; Dumeril, Hist. Poiss. ii, p. 538.
Trachyrhamphus cultrirostris, Peters, Monatsber. Ak. Wiss. Berlin, 1869, p. 710 (*young*).
Kadil cudray and *Cul-pamboo*, Tamil.

D. 25-27, P. 17, A. 4, C. 6, Osseous rings 21-25 + 45-47.

Length of head from 5 to 6 in the distance between end of snout and vent: trunk from above 1/2 to nearly 2/3 of the total length. *Eyes*—large, situated in the middle of the length of the head. A spinate or serrated crest along the upper edge of the posterior 2/3 of the snout. Length of snout less than 1/2 of length of head: interorbital space broad, with the orbital edges prominent, smooth: occiput and nape with a median ridge: opercle finely striated. Body scarcely deeper than broad: shields without spines: vent nearly below the middle of the dorsal fin, the base of which is elevated, it stands on 5 or 6 rings, 2 of which are anterior to the anal ring: caudal fin extremely small: egg-pouch more than half as long as tail. *Lateral-line*—bent downwards and passes into the lower edge of the tail. *Colours*—light brown with light spots along the side, and the body banded in rings: tail fin black with a white lower edge: a dark mark at base of anterior dorsal rays; and a dark line along the middle of the fin.

Habitat.—Seas of India to China. The example figured, a male, was from Madras, where it is very common.

2. Syngnathus longirostris, Plate CLXXIII, fig. 5.

Trachyrhamphus longirostris, Kaup, Lophob. p. 24; Dumeril. Hist. Poiss. ii, p. 538.
Syngnathus longirostris and *? Ceylonensis*, Günther, Catal. viii, pp. 167, 168.

D. 27, P. 18, A. 4. Osseous rings, 23 + 49 + x.

Length of head $3\frac{3}{4}$ in the distance between the end of the snout and the vent: the end of the tail is injured in the single example procured at Madras, but the length of the trunk from the end of the snout to the vent is scarcely more than 1/3 of the total length. Egg pouch not 1/2 as long as the tail. *Eyes*—1/4 of length of snout and situated in the posterior 1/2 of the distance between the end of the snout and base of the pectoral fin. Body deeper than broad. No elevated ridge along the upper surface of the snout. Length of snout

more than half the length of the head. Interorbital space nearly flat. A low and blunt ridge at the occiput and nape. Opercle covered with fine radiating lines. Vent below middle of the dorsal fin. Body prominent inferiorly from the sixth to the eleventh body rings. *Fins*—dorsal low, it commences on the third body ring before the one carrying the vent, it is situated on seven rings, and has its base elevated. *Colours*—grayish brown, with dark rings: under surface of snout light coloured with dark spots.

My unique Madras example (figured) has the comparatively thin body of *S. Ceylonensis*, Günther (example *a*), but has more osseous rings in the tail. It does not seem improbable that *S. Zanzibarensis*, Günther, may be partly this species, and perhaps example "*c*. Adult. China. Presented by Vice-Admiral Sir E. Belcher," may be the second example which Kaup stated existed in the British Museum collection. Dumeril ii, p. 519, considers *S. Zanzibarensis*, Günther, identical with *S. bicoarctatus*, Bleeker.

Habitat.—? Ceylon, Madras and China.

3. Syngnathus intermedius, Plate CLXXIII, fig. 6.

Trachyrhamphus intermedius, Kaup, Loph. p. 24; Dumeril, Hist. Poiss. ii, p. 538.

Syngnathus intermedius, Günther, Catal. viii, p. 168.

D. 28, P. 18, A. 4, C. 9. Osseous rings 24-25 + 48-49.

Length of head $3\frac{3}{4}$ to $4\frac{1}{4}$ in the distance between the end of the snout and the vent: the length of the trunk, between the end of the snout and the vent, equals $1\frac{2}{3}$ in the total length. Egg-pouch 2/5 of length of tail. *Eyes*—diameter $3\frac{1}{2}$ in the length of the snout and situated in the posterior 1/2 of the head. Body deeper than broad. Length of snout 1/2 of that of the head and without any elevated ridge along its upper surface except a projection above the nostrils. Interorbital space slightly concave, owing to the supraorbital ridges being well developed. A low and blunt projection on occiput continued as a sharper ridge along the nape. Opercle with fine radiating lines. *Fins*—dorsal of moderate height, it commences on the third body ring before the one carrying the vent, it is situated on 6 or 7 rings, having its base elevated. Length of caudal fin equal to 1/2 that of snout. *Colours*—grayish and banded: dorsal fin spotted.

Habitat.—A pair captured at Madras: they appear to be identical with *Syngnathus Ceylonensis*, example *b*. British Museum catalogue, from Zanzibar.

B.—*A bony ridge entirely crossing the opercle.*

4. Syngnathus spicifer, Plate CLXXIV, fig. 1.

Rüppell, N. W. Fische, p. 143, t. 33, f. 4; Kaup, Lophob. p. 34; Dumeril, Hist. Poiss. ii, p. 546; Günther, Catal. viii, p. 172; Klunz. Fische Roth. Meer, 1871, p. 650.

Syngnathus djarong, gastrotænia and *Helfrichii*, Bleeker, Trosk. p. 22, Wetensch. pp. 22, 29, Bantan, p. 325, Ceram, p. 714, Borneo, p. 428 and en. Pisc. p. 187; Dumeril, Hist. Poiss. ii, pp. 545, 546, 547.

Syngnathus argyrostictus and *biserialis*, Kaup, Lophob. p. 33; Day, Fish. Malabar, p. 264; Dumeril, l. c. p. 545.

Microphis tenuis, Blyth, Proc. As. Sc. Beng. 1858. p. 272.

Ea-de or *Lak-atha-dah* or "Turtles tail," Andamanese.

D. 23-27, P. 16, A. 2, C. 8. Osseous rings 15-16 + 39-42.

Length of head $2\frac{2}{3}$ in the distance between the end of the snout and the vent: the length of the trunk from the end of snout to vent 2/5 of the total length. *Eyes*—nearly 1/6 of the length of the head, 3 diameters from end of snout. Gill-cover crossed by a raised longitudinal keel: an elevated ridge along the upper edge of the snout and extending to the nape. Interorbital space concave (due to the upper margin of the orbit being elevated), and which ends posteriorly in a ridge which is continued to the nape. Body compressed, higher than wide: ventral edge very prominent. Length of egg-pouch rather more than 1/2 that of the tail. *Fins*—the dorsal is situated on the first five rings of the caudal: the anal rays are minute and sometimes imperceptible. Rings with smooth edges, the division between one and the next but little apparent. *Colours*—generally light brownish, with a dark brown streak extending from the orbit to the angle of the mouth, and a second from the posterior angle of the eye over the opercle: a few black spots on under surface of the lower jaw: body inferiorly with fine brown bars. Dorsal fin barred with brown spots: caudal blackish with a light brown base.

Habitat.—Seas, estuaries, and fresh waters of Red Sea, East coast of Africa, India, and the Malay Archipelago: it ascends rivers high above the influence of the tides, even into fresh water. Grows to about 5 inches in length. The example figured was from the Andamans.

5. Syngnathus cyanospilos.

Bleeker, Nat. Tyds. Ned. Ind. vi, 1854, Banda, p. 114, and en. Pisc. p. 187; Dumeril, Hist. Poiss. ii, p. 555; Günther, Catal. viii, p. 170.

Syngnathus Mossambicus, Peters, Monats. Ak. Wiss. Berl. 1855, p. 465, and Flussfische v. Mossamb. p. 104, t. xx, f. 3.

Syngnathus Kuhlii, Kaup, Lophob. p. 34.

D. 20-23, P. 14, A. 4, C. 10. Osseous rings 12-15 + 33-35.

Length of head $8\frac{1}{4}$ in the total length, or $3\frac{1}{3}$ in the distance between the end of the snout and the vent: the length of the trunk $2\frac{3}{4}$ in the total length. *Eyes*—diameter 6 to $6\frac{1}{2}$ in the length of the head. Snout much longer than the postocular region, and equalling the distance from the hind edge of the eye to the middle of the pectoral fin. A low median ridge along the snout, crown, and nape: a second along the side of the head. *Fins*—dorsal on six rings commencing on the last body ring. *Colours*—body with irregular brown cross bars, each with a white posterior edge: black dots on the dorsal.

Habitat.—East coast of Africa, seas of India, to the Malay Archipelago.

Genus, 2—Ichthyocampus, *Kaup.*

The ridges of the concave back and tail are continuous, and are continued (although sometimes very indistinctly) to the caudal fin. Dorsal fin nearly or quite opposite to the vent. Pectorals and caudal present. Males with an egg-pouch, having a cutaneous covering, situated on the tail.

Geographical distribution.—Seas of India to Australia.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Ichthyocampus carce*, D. 23-26, Osseous rings 15-16 + 38-40. Brown, with milk-white spots on the body. Seas, estuaries, and fresh waters of India to the Malay Archipelago.

1. **Ichthyocampus carce**, Plate CLXXIV, fig. 2.

Syngnathus carce, Ham. Buch. Fish. Gang. pp. 13, 362; Gray and Hard. Ill. Ind. Zool. (from H.B.'s MSS.); Bleeker, Beng. pp. 80, 161.

Typhlus Ponticerianus, Bibron, Paris Mus. (Kaup.)

Ichthyocampus Ponticerianus, Kaup, Lophob. p. 31; Kner, Novara Fische, p. 391; Day, Fish. Malabar, p. 263; Dumeril, Hist. Poiss. ii, p. 540.

Ichthyocampus carce, Kaup, l. c. p. 30; Dumeril, Hist. Poiss. ii, p. 540; Günther, Catal. viii, p. 176.

D. 23-26, P. 17, A. 2, C. 6, Osseous rings 15-16 + 38-40.

Length of head $3\frac{1}{2}$ in the distance between the end of the snout and the vent: the distance between end of snout and vent is $2\frac{2}{3}$ in the total length. *Eyes*—diameter 1/6 of length of head, nearly 3 diameters from end of snout, and 1/3 of a diameter apart. Body higher than it is wide. Snout slightly elevated in its anterior third: interorbital space slightly concave, with a sharp low median ridge passing along the snout: another exists in the occipital region. A very sharp straight ridge crosses the opercle. Egg-pouch about 1/2 as long as the tail. *Fins*—the dorsal is situated on the second to the eighth caudal rings. *Rings*—with smooth edges. *Colours*—deep brown, with one—occasionally two—milk-white spots in the centre of each body ring along the infero-lateral ridge: the lower surface of the snout dotted with black spots: dorsal fin yellow: pectoral and caudal leaden-colour: eye greenish-blue.

Habitat.—Seas, estuaries, and fresh waters of India and Malay Archipelago; where it grows to about 5 inches in length.

B.—*Humeral bones united: male with egg-pouch on abdomen: pectoral and caudal fins present.*

Genus, 3—Doryichthys, *Kaup.*

Doryrhamphus, *Chæroichthys*, and *Microphis*, Kaup: *Belonichthys*, Peters.

Ridges on body well-developed: lateral-line interrupted or continued to the lower edge of the tail. Dorsal fin situated opposite the vent and of moderate length or elongated.

Geographical distribution.—Seas of the tropics, some species entering fresh waters.

SYNOPSIS OF SPECIES.

1. *Doryichthys cunculus*, D. 50, Osseous rings 17-18 + 25-27. Dorsal fin stands on 11 rings. Tidal rivers along the coasts of India.
2. *Doryichthys Bleekeri*, D. 40-45, Osseous rings 21 + 22. Dorsal fin stands on 9 rings. Malabar.
3. *Doryichthys deocata*, D. 30, Osseous rings 16 + 32. Rivers of Bengal and Behar.

1. **Doryichthys cunculus**, Plate CLXXIV, fig. 4.

Syngnathus cunculus, Ham. Buch. Fish. Ganges, pp. 12, 362; Bleeker, Beng. p. 80.

Microphis cunculus, Kaup, Catal. Lopho. Fish. Brit. Mus. p. 64; Day, Fish. Malabar, p. 266; Dumeril. Hist. Poiss. ii, p. 591.

Doryichthys cunculus, Günther, Catal. viii, p. 181.

Kunnur dant, "Crocodile's teeth," Ooriah.

D. 50, P. 16-18, A. 2, C. 8-9, Osseous rings 17-18 + 25-27.

Length of head $4\frac{1}{3}$ in the distance between the end of the snout and the vent: length of trunk from snout to vent about 1/2 of the total length. *Eyes*—of moderate size, situated in the middle of the length of

the head, and 3 diameters from the end of the snout. A fine ridge extends along the upper surface of the snout to between the eyes: an elevated ridge divides the gill-cover into two halves. Snout somewhat elevated. Edges of shields without spines. The lateral-line uninterrupted, it unites in the form of an arch with the lower border of the first caudal ring. *Fins*—dorsal fin stands on 11 rings, 2 of which are anterior to the anal ring. *Colours*—green superiorly, dirty white beneath: on the back several dusky lines intersect each other, forming a net-work: along either side a longitudinal spotted stripe: caudal reddish: eyes silvery: opercle burnished like silver.

In Orissa the natives asserted that these little pipe-fishes have some mysterious connection with the teeth of the crocodile, some of the fishermen believing them to be vivified teeth, others that they are rejected toothpicks.

Habitat.—Tidal rivers ascending far above tidal influence. I have taken them from rivers in Bengal and Orissa, from which latter locality the specimen figured was obtained; and it is said that Dussumier sent seven examples from Malabar to Paris. It attains 7 inches or more in length.

2. Doryichthys Bleekeri, Plate CLXXIV, fig. 3.

Microphis Bleekeri, Day, Fish. Malabar, p. 265; Dumeril, Hist. Poiss. ii, p. 599.
Doryichthys Bleekeri, Günther, Catal. viii, p. 182.

D. 40-45, P. 21, A. 2, C. 9, Osseous rings 21 + 22.

Length of head $3\frac{1}{3}$ in the distance between the end of the snout and the vent: trunk from end of snout to vent nearly 2/3 of the total length. *Eyes*—slightly oval, diameter $7\frac{1}{2}$ in the length of the head, $4\frac{1}{2}$ diameters from end of snout, and 1/2 a diameter apart. The lateral-line posteriorly arches downwards and reaches the infero-lateral caudal ridge at the base of the ring behind the anal one. Snout compressed, curving slightly upwards at its extremity: opercle with a horizontal ridge along its centre, having five more ridges proceeding below it to its posterior and inferior margins: a ridge on the nape. *Fins*—the dorsal is placed upon 9 rings, the first of which is the anal ring: the pectoral wide and short: the caudal lanceolate and equal in length to half that of the snout. *Rings*—each very distinctly separated from the next, and ending in a moderately sharp spine posteriorly, causing the surface to feel quite rough to the finger passed from behind forwards. In the female there are sometimes two spines to the end of each ring, and they are much sharper and longer than in the male. *Colours*—a bright red line at the gills, and along the lateral-line, otherwise of a light brown with a dark line proceeding forward from the eye, and the under surface of the snout barred with brown: fins light brown.

Habitat.—Not rare in the Alwaye river at Cochin. Grows to at least 8 inches in length.

3. Doryichthys deocata.

Syngnathus deocata, Ham. Buch. Fish. Ganges, pp. 14, 363; Gray and Hard. Ill. Ind. Zool. (from H. B.'s MSS.); Bleeker, Beng. p. 80.
Microphis deocata, Kaup, Lophob. p. 64; Dumeril, Hist. Poiss. ii, p. 590.

D. 30, P. 15, A. ? C. 17? Osseous rings 16 + 32.

Snout longer than in *D. cunculus*. *Fins*—dorsal stands on six rings, two of which belong to the body. *Colours*—generally brown: bright red under the lateral-line and dotted with blue. In Gray and Hardwicke the lower surface is red, vertically banded with darker stripes edged with blue, at the upper end of each dark stripe is a white dot or angular mark.

Habitat.—Rivers of Bengal and Behar.

C.—*Male with ova attached to the abdomen and no closed pouch; pectorals absent: caudal, when present, rudimentary.*

Genus, 4—Nerophis, *Rafinesque.*

Netasomata, Eichwald: *Scyphius*, Risso: *Entelurus*, A. Dumeril.

Body rounded and ridges when present very indistinct: the tail tapering to a point without possessing any or only a rudimental caudal fin. Dorsal fin of moderate length placed opposite to the vent: the pectorals absent. Ova attached to the loose integument of the abdomen in the males, and not covered by lateral cutaneous folds.

Geographical distribution.—Bombay, Atlantic and the coasts of Europe.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Nerophis Dumerilii*, D. 37. Osseous rings 27 + 65. Bombay.

1. Nerophis Dumerilii.

Steindachner, Sitz. Ak. Wiss. Wien. 1868, lvii, p. 1002; Günther, Catal. viii, p. 191.
Entelurus Dumerilii, Dumeril, Hist. Poiss. ii, p. 607.

D. 37, C. 7. Osseous rings 27 + 65.

Length of trunk from snout to vent 1/3 of the total length. Snout half as long as the head. Forehead

concave: an obtuse ridge above the opercle continued to the hind edge of the orbit. *Fins*—dorsal commences behind the twentieth ring: its base is on ten rings, 3 of which belong to the tail. Caudal rudimentary.

Habitat.—Bombay.

Second group—Hippocampina.

Tail prehensile: caudal fin absent.

Genus 5—Gastrotokeus *(Heckel) Kaup.*

Syngnathoides and *Solegnathus*, Bleeker.

Body depressed, having smooth shields and a prehensile tail, which latter is not so long as the body. Dorsal fin of moderate length placed nearly opposite the vent: pectorals and anal present: caudal absent. The lateral-line passes along the edge of the abdomen. Ova imbedded in soft substance on the abdomen of the males, but there is no pouch formed of lateral cutaneous folds.

Geographical distribution.—East coast of Africa, seas of India to the Malay Archipelago, China, and Australia.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Gastrotokeus biaculeatus*, D. 40-45. Osseous rings 16-18 + 45-55. Red Sea, East coast of Africa and seas of India to China and Australia.

1. Gastrotokeus biaculeatus, Plate CLXXIV, fig. 5.

Syngnathus biaculeatus, Bloch, t. 121; Bl. Schn. p. 515, t. 107; Shaw, v, p. 453; Richardson, Ich. China, p. 202; Cantor, Catal. p. 387.

Syngnathus tetragonus, Gmel. Linn. p. 1453; Lacép. ii, p. 46.

Syngnathoides Blochii, Bleeker, Nat. Tyds. Ned. Ind. ii, Banda, p. 259.

Solenognathus Blochii, Bleeker, Verh. Bat. Gen. xxv. Trosk. p. 24.

Gastrotokeus biaculeatus, Kaup, Lophob. p. 19; Peters, Moss. Fische; Bleeker, En. Pisc. p. 189; Dumeril, Hist. Poiss. ii, p. 528; Günther, Catal. viii, p. 194; Klunz. Fische Roth. Meer. 1871, p. 653.

D. 40-45, P. 17-23, A. 4. Osseous rings 16-18 + 45-55.

Length of head about 1/3 of the distance between the end of the snout and the vent: the tail shorter than the trunk. *Eyes*—situated in the posterior half of the distance between the end of the snout and the base of the pectoral fin. A well defined supraorbital spine above the hind edge of the eye: interorbital space concave. Occiput destitute of a coronet, but with a distinct blunt projection: usually a barbel-like filament on the mandible and in some examples cutaneous filaments exist on lower surface of jaws and on the body. *Fins*—dorsal situated on ten rings, commencing on the one anterior to the anal, or else on the anal ring. Anal fin situated in a depression: a projection covered with well-developed papillæ exists just in front of the vent. *Colours*—these vary in different localities. Pale green or brown superiorly, becoming of an orange or buff on the under surface, a light spot edged with very pale vermilion on the side of each body ring: in some, black spots are scattered along the sides of the lower surface of the body. Lower surface of the head with dark spots or bands.

Habitat.—Red Sea, East coast of Africa, seas of India to the Malay Archipelago, China, and Australia. It attains to at least $9\frac{3}{4}$ inches in length. The example figured was from the Malay Archipelago.

Genus, 6—Acentronura, *Kaup.*

Body rather compressed, with shields without tubercles, and a prehensile, finless tail: occiput compressed into a crest without any coronet. Dorsal fin with rather few rays: pectorals present. Ova carried by the males in a sac, which is situated below the tail and opening near the vent.

1. Acentronura gracillima, Plate CLXXVI, fig. 1.

Hippocampus gracillimus, Temm. and Schleg. Fauna Japon. Poiss, p. 274, t. cxx, f. 7.

Acentronura gracillima, Kaup, Lophob. p. 18; Dumeril, Hist. Poiss. ii, p. 527; Günther, Catal. viii, p. 198.

D. 16-17, P. 15, A. 2. Osseous rings 13 + 41-45.

Tail a little longer than the body. Snout 2/5 of the length of the head. Occiput compressed into a crest, but without any coronet. *Fins*—the dorsal standing on four rings, two of which belong to the tail: its base not elevated. *Colours*—brownish, covered with small white dots, and likewise little brown markings which in the female almost form bands, especially across the ventral surface. A row of dark spots along the upper third of the dorsal fin, forming a band. The *male* is darker and of a bluish colour, with a milk-white spot on each body ring.

Two examples, neither exceeding 1·5 inches in length, were dredged by Mr. J. Wood-Mason, off the coast of the Andamans, at 35·40 fathoms. It appears to attain to 3 inches in length.

Genus 7—Hippocampus, *Leach.*

Trunk compressed and somewhat elevated, having from 10 to 12 rings. The shields furnished with tubercles or spines. Occiput compressed and forming a coronet at its posterior superior angle, which is usually surmounted by

spines or knobs. Dorsal and pectoral fins present: the tail prehensile, finless, and longer than the trunk. Males furnished with an egg-sac situated below the tail and opening near the vent.

Geographical distribution.—These marine fishes are found generally distributed throughout tropical and temperate seas. Owing to their attaching themselves (by means of their prehensile tails) to floating substances and pieces of seaweed, or sticks which break from their moorings, these fishes are carried away for long distances by currents, causing the limits of their distribution to be very extensive.

These horse-fishes are difficult to distinguish one from another, owing to slight variations in the number of osseous rings, individual deviations in some of the proportions of the body as the length of the snout, and in the existence and development of the tubercles and the shape of the plates. The number of rays in the dorsal fin appears to be moderately constant.*

SYNOPSIS OF SPECIES.

1. *Hippocampus trimaculatus*, D. 19-20. Osseous rings 11 + 36. Coronet of moderate height or low. Burma to Pinang and China.
2. *Hippocampus guttulatus*, D. 16-17. Osseous rings 11 + 33. Coronet rather low. Red Sea, Indian Ocean to Japan and tropical parts of the Atlantic.
3. *Hippocampus hystrix*, D. 17-18. Osseous rings 11 + 36-37. Tubercles in the form of sharp spines. East coast of Africa, seas of India to Japan.

1. Hippocampus trimaculatus, Plate CLXXIV, fig. 7.

Leach, Zool. Misc. p. 104; Günther, Catal. viii, p. 204.

Hippocampus mannulus, Cantor, Catal. Malay. Fish. p. 388, pl. xi, f. 1; Kaup, Lophob. p. 14; Blyth, Journ. A. S. of Beng. 1860, p. 173.

D. 19-20, P. 17, A. 4. Osseous rings 11 + 36.

Eyes—diameter 1/8 of the length of the head. Length of snout equals the distance between the front edge of the eye and the gill-opening. Tubercles variously developed, in some long and acute, in others low: coronet similarly high or low, with a tubercle anteriorly, and surrounded by 5 rudimentary or well-developed spines: a low supraorbital spine and one on either side of the throat, which are of about the same shape, pointed and curved backwards. *Fins*—dorsal situated upon the last 2 rings of the trunk, and the first of the tail. *Spines*—very diversified, exceedingly low in some examples, not so in others. *Colours*—pale yellow ochre: two rows of blackish spots along the dorsal fin, and occasionally three large brown blotches along the edge of the back on the first, fourth, and seventh body rings: in some there are numerous fine black dots over the body. Sometimes light marks exist on the side of the back, and the body is banded.

Habitat.—Andamans, Tenasserim to Pinang and the seas of China.

2. Hippocampus guttulatus, Plate CLXXIV, fig. 6.

A.—*Synonymy for Atlantic examples.*

Syngnathus, Sp. Brown, Jam. p. 441, No. 1.

Hippocampus guttulatus, Cuv. Règne, Anim.; Kaup, Lophobr. p. 9; Dumeril, Hist. Poiss. ii, p. 509; Günther, Catal. viii, p. 202.

Hippocampus punctulatus, Guichen in Sagra, Cuba, Poiss. p. 174, pl. v, fig. 2; Kner, Novara Fische, p. 390; Dumeril, l. c. p. 508.

Hippocampus longirostris, Kaup, Lophobr. p. 12, pl. 3, fig. 2; Dumeril, l. c. p. 518.

B.—*Synonymy for Indian examples.*

Hippocampus kuda, *Moluccensis*, *tæniopterus*, *polytænia*, and *melanospilos*, Bleek. Nat. Tyds. Ned. Ind. iii, pp. 82, 305, 306, and vi, pp. 338, 505, and Verh. Bat. Gen. xxv, Trosh. p. 26; Dumeril, l. c. pp. 505, 506, 522.

Hippocampus comes, Kaup, Lophobr. p. 10; Day, Fish. Malabar, p. 262 (not Cant.).

? *Hippocampus punctulatus*, Kaup, Lophobr. p. 14 (*H. Kaupii*, Dumeril).

Hippocampus Deanii, Dumeril, Afric. Occid. Arch. Mus. x, p. 243, and Hist. Poiss, ii, p. 510.

Hippocampus punctulatus, *guttulatus* and *monckei*, Günther, Fish. Zanz. p. 139.

D. 16-17 (18), P. 17, A. 4. Osseous rings 11 + 33.

Eyes—diameter 1/6 to 1/7 of the length of the head, the anterior margins of the orbits situated midway between the end of the snout and the posterior extremity of the head. There are two supraorbital spines directed backwards and outwards. The coronet is rather low, with from 4 to 6 blunt tubercles. The tubercles on the body and tail are generally obtuse. *Fins*—the dorsal fin stands on the last two body rings and the first two tail rings. *Colours*—vary, generally grayish marbled with darker and covered with light or dark spots: or brown with black spots or cross bands. Dorsal fin may have a dark intramarginal band with a white outer edge.

* For the method in which the females introduce the eggs into the egg-carrying pouch of the male, see Fanzago, Atti Soc. Pad. 1874, p. 161.

Habitat.—Red Sea, Indian Ocean to Japan, also tropical parts of the Atlantic. It attains 11 or 12 inches in length.

3. **Hippocampus hystrix**, Plate CLXXVI, fig. 2.

Kaup, Lophob. p. 17, t. 2, f. 5; Guich. Fauna Reunion, Append. p. 30; Dumeril, Hist. Poiss. ii, p. 514; Günther, Catal. viii, p. 206.

D. 17-18, P. 16. Osseous rings 11 + 36-37.

Coronet high with 5 spines, and a tubercle anteriorly, in front of which is another spine. Snout slender, as long as the distance between the front margin of the orbit and the first nuchal spine: two strong spines above the posterior and one above the anterior margin of the orbit: 2 spines below the centre of the orbit, and one behind the middle of its posterior edge. All the tubercles (except those on the end of the tail) in the form of slender and pointed spines. *Colours*—gray, or yellowish white, with numerous brown and also smaller white dots: 6 or 7 light patches on the tail, covered with dark spots, and one or more similar spots on the body. Snout dark, with a light ring. Each spine black at the tip.

Habitat.—Zanzibar, Reunion, Aden, Andamans and Japan. An example from Aden in the Calcutta museum is 4·5 inches in length. Mr. Wood-Mason dredged up the specimen figured life-size, at the Andamans, in 35·40 fathoms.

Order, V—PLECTOGNATHI, *Cuvier.*

Teleostean fishes with an incompletely ossified skeleton and few vertebræ. Gill-openings narrow, situated in front of the pectoral fins: gills pectinate. Head often large. Mouth narrow: the bones of the upper jaw mostly united, sometimes produced into the form of a beak. Teeth may be distinct in the jaws or absent. There may be a single soft-rayed dorsal fin belonging to the caudal portion of the vertebral column, and situated opposite the anal: while in some a rudimentary spinous dorsal is also present: ventrals, when existing, in the form of spines. Skin either smooth, or with rough scales, or ossified in the form of plates or spines. Air-vessel destitute of a pneumatic duct.

Geographical distribution.—Mostly oceanic, but some are found in large rivers, and many in estuaries and tidal pieces of water in temperate and tropical portions of the globe.

SYNOPSIS OF FAMILIES.

1. *Sclerodermi.* Distinct teeth in the jaws.
2. *Gymnodontes.* Jaws modified into a beak.

Family, I—SCLERODERMI, *Cuvier.*

Body compressed or angular: snout somewhat produced. Distinct teeth in small numbers in the jaws. A barbel in one genus. The elements of a spinous dorsal and ventral fins generally present, but variously modified. Skin rough or spinate, or the scales in the form of a firm carapace.

Geographical distribution.—Marine fishes found in tropical and temperate regions.

SYNOPSIS OF INDIAN GENERA.

First group—Triacanthina.

Body compressed: dermal covering in the form of small, rough, scale-like scutes. A spinous dorsal with from 4 to 6 spines: a pair of strong ventral spines articulated to the pelvic bones.

1. *Triacanthus.* Outer row of teeth cutting, p. 684.

Second group—Balistina.

Body compressed: dermal covering rough, or with movable scutes. Spinous dorsal with from 1 to 3 spines: ventrals, if present, consisting of a single pelvic projection.

2. *Balistes.* Three dorsal spines: no barbels, p. 686.
3. *Monacanthus.* One or two dorsal spines: no barbels, p. 692.
4. *Anacanthus.* A barbel present, p. 694.

Third group—Ostraciontina.

Body angular with the dermal covering forming a carapace, leaving the snout and bases of the fins covered by skin. Spinous dorsal and ventral fins absent, except in the form of osseous protuberances.

5. *Ostracion.* Teeth small, slender and in a single row. Carapace closed behind the anal fin, p. 695.

First group—Triacanthina.

Body compressed: dermal covering in the form of small, rough, scale-like scutes. A spinous dorsal with from 4 to 6 spines: a pair of strong ventral spines, articulated to the pelvic bones.

Genus, 1—Triacanthus, *Cuvier.*

Body oblong, compressed, ending in a somewhat elongated caudal portion. Eyes lateral, high up, situated near the hind edge of head. Teeth in two rows in both jaws, the outer 10 in number, being incisor-like: the inner, from 2 to 4, being more molariform. First dorsal fin consisting of a long and strong spine, followed by from 3 to 5 smaller and weak ones: ventrals formed by a pair of strong spines articulated by a joint or ossified to the pelvic bones: caudal lobed. Scales minute and rough. Lateral-line present. Air-vessel strong.

In fishes of this genus, the proportions of the height of the body, the length of the head and extent of the spines vary with age, and also in individuals of the same species.

Geographical distribution.—From the shores of Beloochistan, through the seas of India to those of Australia.

SYNOPSIS OF SPECIES.

1. *Triacanthus brevirostris.* Snout of moderate length: second dorsal spine of same length as third: length of base of anal 2/3 of length of head. A black blotch on first dorsal fin. Seas of India to the Malay Archipelago, and beyond.

2. *Triacanthus strigilifer.* Snout elongated: second dorsal spine three times as long as third: length of base of anal 1/2 of length of head. Yellow blotches and lines on body. Madras to Malay Archipelago and beyond.

1. Triacanthus brevirostris, Plate CLXXV, fig. 1.

Balistes, Russell, Fish. Vizag. i, p. 14, and *Bowree* or *Abatoo*, pl. 21.

Balistes biaculeatus, Bennett, Fish. of Ceylon, p. 15, pl. xv; Cantor, Catal. p. 360; Bleeker, Madura, p. 6; Jerdon, M. J. L. and Sc. 1851, p. 149; Day, Fish. Mal. p. 260.

Triacanthus Russellii, Bleeker, Beng. p. 80.

Triacanthus brevirostris, Temm. and Schleg. Fauna Japon. Poiss. p. 294, t. 129, f. 2; Hollard, Ann. Sc. Nat. 1854, i, p. 45, t. 2, f. 1; Bleeker, en Pisc. p. 196, Atl. Ich. v, p. 91, pl. ccxxxi, f. 3; Günther, Catal. viii, p. 209.

Triacanthus rhodopterus, *Russellii*, *Nieuhofi* and *brachysoma*, Bleeker, Balist. pp. 25, 26, t. 4, f. 8 and 9, Banka, p. 459, Amboina, p. 128, and Atl. Ich. v, p. 92, t. ccxvii, f. 3.

Balistes bipes, Gronov. ed. Gray, p. 37.

Satura, Ooriah: *Moolean*, Tamil.: *Ko-tah-thoo-lay-po-dah*, Andamanese: *Ankatilla*, Cingalese: *Turgoorch*, Beloochistan.

B. vi, D. 5/22-25, P. 14, V. 1. A. 16-20, C. 12.

Length of head $4\frac{1}{2}$ to $4\frac{2}{3}$, of caudal $4\frac{1}{4}$ to $4\frac{3}{4}$, height of body $3\frac{1}{4}$ to $3\frac{1}{2}$ in the total length. *Eyes*—high up, diameter 1/4 of length of head, $2\frac{1}{2}$ diameters from the end of snout and $1\frac{1}{3}$ apart. A considerable rise from the snout to the first dorsal fin, and an elevation opposite the orbits. *Teeth*—outer row in upper jaw consisting of 8 compressed cutting teeth, the inner row 6 in number rounded, and the two centre ones the longest: in the mandibles 10 in the outer and 2 in the inner row, smaller than but otherwise similar to those in the upper jaw. *Fins*—first dorsal spine very strong, longer than the head in the immature, of about equal length or shorter in the adult: second and third spines weak and of about equal length: dorsal fins close together in the very young, not so in the adult. Anal highest anteriorly, its lower edge concave, the length of its base 2/3 of that of the head: ventral spine slightly shorter than that of the first dorsal: pectoral short and rounded: caudal deeply lobed. *Colours*—silvery, with a black spot on the first dorsal fin, and which extends a short distance on to the back: usually a dark supraorbital blotch.

Bennett observes that it is generally found in deep water, and rarely on the Southern coast of Ceylon: by the native fishers it is considered wholesome food. In India it is rejected, except by the lowest classes. Russell remarks that these fish are caught in such vast numbers after the month of May, as to injure the nets.

Triacanthus biaculeatus, Bloch, bears a considerable resemblance to this species, but has the snout much more elongated. Bleeker considered the relative height of the body in *T. Nieuhofi*, as greater than in *T. brevirostris*, and that it had a shorter and more obtuse head.

Habitat.—Seas of India to the Malay Archipelago, and beyond; attaining at least $9\frac{1}{2}$ inches in length.

2. Triacanthus strigilifer, Plate CLXXV, fig. 2.

Cantor, Catal. Mal. Fish, p. 363, pl. 9; Bleeker, Amboina, p. 97, and Atl. Ich. v, p. 89, t. cclxxix, f. 3; Jerdon, M. J. L. and Sc. 1851, p. 149; Günther, Catal. viii, p. 211.

Triacanthus longirostris, Hollard, Ann. Sc. Nat. 1854, i, p. 46, t. 2, f. 3.

Rama moolean, Tamil.

B. vi, D. 5/22, P. 14, V. 1, A. 15-16, C. 12.

Length of head 4 to $4\frac{1}{4}$, of caudal 5, height of body $3\frac{3}{4}$ in the total length. *Eyes*—high up, diameter $3\frac{1}{2}$ to $3\frac{3}{4}$ in the length of head, $2\frac{1}{3}$ diameters from end of snout and $1\frac{1}{4}$ apart. The upper profile between the eye and snout rather concave. *Teeth*—8 compressed and cutting ones form the outer row in upper jaw, whilst the inner row consists of 4 rounded ones: 10 similar ones in the outer and 2 in the inner row of the lower jaw. *Fins*—first dorsal spine very strong and longer than the head, the remaining ones weak: the second being more than 1/2 as long as the head, and 3 times as long as the third: fins otherwise similar to those of the last species, except that the length of the base of the anal is only about 1/2 of that of the head. *Colours*—silvery, with some wide irregular yellow lines and blotches on the head and body.

Habitat.—Madras to the Malay Archipelago, China, and the Philippines. The example figured was from Madras.

Second Group—Balistina.

Body compressed: dermal covering rough, or with movable scutes. Spinous dorsal with from 1 to 3 spines: ventrals, if present, consisting of a single pelvic projection.

Genus, 2—Balistes, sp. *Artedi.*

Balistapus, Tiles: *Xenodon*, *Erythrodon* and *Pyrodon*, Rüppell: *Melichthys* and *Leiurus*, Swainson: *Balistapus*, Kaup: Sub-genera, *Parabalistes*, *Pseudobalistes*, *Canthidermis*, Bleeker.

Branchiostegals six. Body compressed. Barbels absent. Sometimes a groove before the eyes. Upper jaw with a double series of incisor-like teeth, 8 in the outer, 6 in the inner row: mandibles with 8 similar teeth in one row: these teeth may be white, uneven, and more or less notched (Balistes): or white, even and incisor-like (Melichthys): or of a burnt sienna colour, with the supero-lateral pair projecting (Erythrodon). The first dorsal fin consisting of a strong spine succeeded by two weak ones: ventrals as an osseous appendage. There may or may not be oval, flattened, osseous, productions behind the gill-opening. Scales forming a carapace: in some species there are rows of spines or turbercles on the side of the free portion of the tail, which is either compressed or depressed.

Eating the flesh of these fishes occasions in places symptoms of most virulent poisoning. Dr. Meunier, at the Mauritius, considers that the poisonous flesh acts primarily on the nervous tissue of the stomach, occasioning violent spasms of that organ, and shortly afterwards of all the muscles of the body. The frame becomes racked with spasms, the tongue thickened, the eye fixed, the breathing laborious, and the patient expires in a paroxysm of extreme suffering. The first remedy to be given is a strong emetic, and subsequently oils and demulcents to allay irritability.

SYNOPSIS OF SPECIES.

A.—*Free portion of the tail depressed.*

1. *Balistes stellatus*, D. 3/26-27, A. 24-25, L. l. 42-46, L. tr. 26.* Grayish green, with white spots and blotches, more or less disappearing with age. From the Red Sea through the Indian and Pacific oceans.

B.—*Free portion of the tail compressed.*

2. *Balistes maculatus*, D. 3/26-27, A. 24-25, L. l. 46-55, L. tr. 28. Teeth white, uneven, notched: cheeks scaled: a groove in front of eye: no osseous scutes behind gill-opening, or spines at side of tail. Bluish, spotted with lighter. Indian, Atlantic and Pacific oceans.

3. *Balistes vetula*, D. 3/30-32, A. 29, L. l. 61-63, L. tr. 37. Teeth white, uneven, notched: cheeks sealed: a groove before eye: osseous scutes behind gill-opening: no spines at side of tail. Two blue bands on side of head: a dark light-edged line below the eye, from which other lines radiate. Bluish bands on fins. Atlantic and Indian oceans.

4. *Balistes niger*, D. 3/26-28, A. 23-25, L. l. 45-47, L. tr. 23-26. Teeth white, uneven, notched: cheeks sealed: a groove before eye: osseous scutes behind gill-opening: 6 to 8 rows of small recurved spines at side of tail. Brown: yellow ring behind lips: caudal with light edges. Red Sea, seas of India to the Malay Archipelago.

5. *Balistes mitis*, D. 3/29-31, A. 26-28, L. l. 55-65. Teeth white, uneven, notched: cheeks scaled: a groove before eye, osseous scutes behind gill-opening: 7 or 8 rows of small round tubercles on scales of side. Brownish with a yellow ring round the mouth continued towards the pectoral fin. East coast of Africa, seas of India to the Malay Archipelago.

6. *Balistes conspicillum*, D. 3/25-26, A. 21-22, L. l. 46. Teeth white, uneven, notched: cheeks sealed, a groove before eye: osseous scutes behind gill-opening: 2½ rows of tubercles at side of tail. Dark, with large white spots on lower half of body: a white band between the eyes and round the snout: caudal white, with two black bands. Indian and Pacific oceans.

7. *Balistes viridescens*, D. 3/24-26, A. 23-24, L. l. 30-34, L. tr. 17. Teeth white, uneven, notched: cheeks scaled: a groove before eye: osseous scutes behind the gill-opening: 4½ rows of recurved spines at side of tail. Brownish olive, with a yellow black-edged ring round the mouth: a dark band from eye to pectoral fin. Andamans to the Malay Archipelago.

8. *Balistes fuscus*, D. 3/25-26, A. 23-26, L. l. 45-55, L. tr. 27-31. Teeth white, uneven, notched: cheeks with stripes of tubercles a little apart: no spines at side of tail. Yellow, with irregular stripes and spots. Red Sea, East coast of Africa, seas of India to the Malay Archipelago.

9. *Balistes flavimarginatus*, D. 3/26-27, A. 23-24, L. l. 30-35, L. tr. 19-21. Teeth white, uneven, notched: a groove before eye: osseous scutes behind gill-opening: 4 to 6 rows of small spines on side of tail. Stone-colour, becoming buff on the chest: a dark spot on each scale: vertical fins with a dark band. Red Sea, Andamans to the Malay Archipelago.

* By L. tr. in this genus, is considered the number of rows of scales placed between the origin of the second dorsal and anal fins.

10. *Balistes aculeatus*, D. 3/24-25, A. 21-22, L. l. 38-40, L. tr. 22. Teeth white, uneven, notched: no groove in front of eye: osseous scutes behind gill-opening: $2\frac{1}{2}$ rows of recurved spines on side of tail. Gray, with a dark blotch along the side of the body, obliquely banded with white; three blue lines pass from the eye to the base of the pectoral fin, and an orange one from the corner of the mouth. Red Sea, East coast of Africa, seas of India to the Malay Archipelago.

11. *Balistes rectangulus*, D. 3/23, A. 20-22, L. l. 42, L. tr. 24-28. Teeth white, uneven, notched: no groove in front of eye: osseous scutes behind gill-opening: $3\frac{1}{2}$ rows of spines on each side of the tail. A broad black blue-edged band from eye to anal fin: an angular black blue-edged band pointing forwards on the side of the tail. East coast of Africa, seas of India to the Malay Archipelago and beyond.

12. *Balistes undulatus*, D. 3/25-26, A. 22, L. l. 40, L. tr. 23-26. Teeth white, uneven, notched: no groove in front of eye: osseous scutes behind the gill-opening: 2 rows of strong, recurved spines on either side of tail. Brownish, with concave yellow lines on body, and 2 or 3 round the mouth. Red Sea, East coast of Africa, seas of India to the Malay Archipelago, and beyond.

13. *Balistes erythrodon*, D. 3/35, A. 30, L. l. 33-35, L. tr. 17. Teeth brownish-red, in upper jaw the one on either side of the central pair projecting: osseous scutes behind gill-opening: slightly raised lines along caudal scales: caudal lobes elongated. Deep brown, with the posterior edge of the caudal nearly white. Red Sea, seas of India to the Malay Archipelago.

A.—*Free portion of the tail depressed.*

1. Balistes stellatus, Plate CLXXVII, fig. 1.

Lacép. i, p. 350 and *Baliste étoilé*, pl. xv, f. 1: Rüppell, Atl. Fische, p. 31; Bleeker, Beng. p. 78, and Balist. p. 13; Peters, Fische Mossam. p. 276; Günther, Catal. viii, p. 212; Klunz. Fische Roth. Meer. 1871, p. 621.

Balistes stellaris, Bl. Schn. p. 476; Cuvier, Règn. Anim.; Richards. Ich. China, p. 200; Hollard, Ann. Sc. Nat. 1854, i, p. 320, t. v, f. 2.

Balistes, Russell, Fish. Vizag. i, p. 16, and *Somdrum Yellakah*, pl. xxiii.

Balistes Vachelli, Richards. Voy. Sulphur. Fish. p. 129, and Ich. China, p. 201.

Balistes phaleratus, Richards. Stokes Australia, i, p. 484, pl. i, f. 4, 5.

Leiurus Russellii, Swainson, Fishes, ii, p. 326.

Balistes forcipatus, Gm. ap. Bleeker, En. Pisc. p. 191 (nec. al.)

Leiurus stellatus, Bleeker, Atl. Ich. v, p. 105, t. ccxv; Kner, Novara Fische, p. 398.

B. vi, D. 3/26-27, P. 15, A. 24-25, C. 13, L. l. 42-46, L. tr. 26.

Length of head $3\frac{3}{4}$ to $4\frac{1}{3}$, of caudal fin 5 to $5\frac{1}{4}$, height of body $2\frac{2}{3}$ to 3 in the total length. *Eyes*—diameter $2\frac{1}{4}$ to $2\frac{3}{4}$ from the end of snout and $1\frac{1}{3}$ apart: a groove in front of the eye. *Teeth*—uneven, notched. Tail posteriorly depressed. *Fins*—first dorsal commences slightly behind the orbit, its anterior spine strong, and 2/3 as long as the head. Ventral spine movable. Posterior edge of caudal concave, and the ends of the lobe often produced in adults. Soft dorsal and anal fins of moderate height. *Scales*—covering the cheeks: some enlarged scutes behind gill-opening. Two ridges on either side of tail in the adult, which in the young are formed of spines on the scales. *Colours*—generally gray, dashed with olive-green. Three large white blotches extend from the back some distance down the sides, the first at the base of first dorsal spine, the second between the two dorsal fins, and the third under the middle of the second dorsal: numerous small bluish spots scattered over the back, the lower half of the body being white, marked with light green bands and spots, or numerous yellow spots on the abdomen: 3 or 4 yellow lines run from the mouth towards the base of the pectoral fin. Pectoral yellow with a dark base. First dorsal nearly white, with irregular dark bands going upwards and backwards, and ending in a yellow blotch, between these are some shorter yellow bands having dark edges. Second dorsal diaphanous, with 7 or 8 tortuous and almost horizontal olive bands, the lowest of which are sometimes broken up into spots. Caudal light gray, with tortuous vertical white lines, most distinct in its posterior half. Anal light brown, with 5 vertical white bands. *Young*—an example 1 inch long, dredged at the Andamans, by Mr. J. Wood-Mason, is white, with a broad black interorbital band: black along the upper 1/3 of the sides with 4 white blotches which join over the back.

Bleeker places as perhaps belonging to this species, *Balistes*, Russell, Fish. Vizag. i, p. 15, and *Lama Yellakah*, pl. xxii, or *Leiurus macrophthalmus*, Swainson, Fishes ii, p. 326, or *Balistes macrophthalmus*, Bleeker, Beng. p. 78, and *B. Yellaka* (Cuv.) Jerdon, M. J. L. and Sc. 1851, p. 149.

Habitat.—Red Sea, East coast of Africa, and seas of India and throughout the Indian and Pacific oceans. This is the commonest species of the genus at Madras, where it attains at least 2 feet in length.

B.—*Free portion of the tail compressed.*

2. Balistes maculatus, Plate CLXXVI, fig. 3.

Gmel. Linn. i, p. 1468; Bloch. t. cli; Bl. Schn. p. 464; Bonn. Ency. Ich. p. 18, t. xi, f. 37; Lacép. i, pp. 334, 361; Kaup, Scler. p. 223; Holl. Ann. Sc. Nat. i, 1854, p. 58; Bleeker, Atl. Ich. v, p. 122, t. ccxviii, f. 4; Kner, Novara Fische, p. 401; Günther, Catal. viii, p. 213.

Balistes sufflamen, Mitchell, Lit. and Phil. Trans. New York, i, p. 467, t. vi, f. 2.

Balistes oculatus, Gray and Hardw. Illus. Ind. Zool.; Bleeker, Atl. Ich. v, p. 121, t. ccxviii, f. 2,

Balistes Willughbeii, Bennett, Proc. Zool. Soc. i. p. 168, and in Beechey's Voy. Blossom, Zool. p. 68, t. xxi, f. 2.

Canthidermis oculatus, Swainson, Fishes, ii, p. 325.

Balistes angulosus, Quoy and Gaim. Voy. Urainie, Zool. p. 210; Hollard, l. c. p. 57.

Balistes azureus, Less. Voy. Coq. Zool. ii, p. 121, t. x, f. 2.

Balistes adspersus, Tschudi, Faun. Per. Pisc. p. 31.

Balistes conspicillum, Cantor, Catal. Mal. Fish. p. 344. (not Syn.)

Balistes longus, Gronov. ed. Gray, p. 37.

Balistes senticosus, Richards. Voy. Samarang, Fish. p. 23, pl. ix, f. 5-8; Bleeker, Nat. Tyds. Ned. Ind. v, p. 93.

Balistes longissimus, Hollard, l. c. 60, t. iii, f. 4.

Balistes sobaco and *macrops*, Poey, Cuba, pp. 324, 326.

B. vi, D. 3/26-27, P. 15, A. 24-25, C. 12, L. l. 46-55, L. tr. 28.

Length of head $3\frac{2}{3}$ to 4, of caudal fin $6\frac{1}{2}$ to 7, height of body $2\frac{1}{2}$ to 3 in the total length. *Eyes*—2 to $2\frac{1}{2}$ diameters from end of snout and 2 apart. A groove in front of eye. *Teeth*—uneven, notched. *Fins*—first dorsal commences above the gill-opening, its anterior spine strong and nearly 1/2 as long as the head. Ventral spine usually movable. Posterior edge of caudal convex or undulated. Second dorsal and anal high anteriorly, especially in adults. *Scales*—cheeks entirely scaled: no osseous scutes behind the gill-opening. Scales rough and granulated, but without spines or prominent tubercles except in the immature. *Colours*—bluish-black, young examples are covered with numerous light blue blotches, more especially in the lower half of the body, these spots are less numerous and larger in adults. Dorsal spine black. Eyes hazel.

Habitat.—Indian and Atlantic oceans, more especially in their tropical and subtropical portions: also the Pacific and occasionally on the British coast. It is very common at Madras, attaining at least 16 inches in length.

3. Balistes vetula.

Linn. Syst. Nat. i, p. 406; Osbeck's Travels, p. 294; Bloch, t. 150; Bl. Schn. p. 470; Lacépède, i, p. 337; Less. Voy. Coq. Zool. ii, p. 113, t. ix, f. 2; Jenyns, Voy. Beagle, Fish. p. 155; Hollard, Ann. Sc. Nat. 1854, i, p. 305; Günther, Catal. viii, p. 215.

B. vi, D. 3/30-32, P. 16, A. 29, C. 12, L. l. 50-60, L. tr. 35-37.

Length of head $3\frac{1}{2}$, and height of body $2\frac{1}{4}$ in the total length, excluding the caudal filaments. *Eyes*—4 diameters from the end of snout and $1\frac{1}{2}$ diameters apart. A groove in front of the eye below the nostrils. *Fins*—first dorsal commences just behind the eye, its spine strong and half as long as the head. In adults the anterior dorsal rays and caudal lobes may be filamentous. *Scales*—cheeks entirely scaly: a patch of enlarged scutes behind the gill-opening. No spines or tubercles on the side of the tail. *Colours*—in the immature some oblique black lines go along the rows of scales. In the adult there are two curved blue dark-edged bands along the side of the head, and some narrow black ones between the eyes over the head, they are also continued below the eyes: caudal with its upper and lower edge blue, and a bluish band near its posterior extremity: transverse bluish bands on the dorsal and anal fins.

Habitat.—Coromandel coast of India and tropical parts of the Atlantic. An example in the Madras museum is 15 inches in length.

4. Balistes niger, Plate CLXXXI, fig. 1.

Mungo Park, Transac. Linn. Soc. iii, p. 37; Bl. Schn. p. 471; Günther, Catal. viii, p. 218; Klunz. Fische Roth. Meer. 1871, p. 627.

Baliste armé, Lacép. i, pp. 336, 382, t. xviii, f. 2.

Balistes Mungo-Park, Lacép. iv, pp. 681, 682.

Balistes chrysopterus, Bl. Schn. p. 466: Kaup, Sclerod. p. 224.

Balistes subarmatus, Gray and Hardw. Illus. Ind. Zool.

Balistes albicaudatus, Rüppell, N. W. Fische, p. 54, t. xvi, f. 1; Richards. Ich. China, p. 201; Peters, Fisch. Mossam, p. 276.

Melichthys albicaudatus, Swainson, Fishes, ii, p. 325.

Balistes verrucosus, Gronov. ed. Gray, p. 33.

Balistes armatus, Bleeker, Balist. p. 16, and Atl. Ich. v, p. 115, t. cxvi, f. 1; Holl. Ann. Sc. Nat. i, 1854, p. 328.

B. vi, D. 3/26-28, P. 14, A. 23-25, C. 12, L. l. 45-47, L. tr. 23-26.

Length of head $3\frac{1}{2}$, of caudal fin $5\frac{1}{2}$, height of body $2\frac{1}{2}$ in the total length. *Eyes*—4 diameters from the end of the snout and $1\frac{1}{3}$ apart. A groove in front of the eye. *Teeth*—compressed and notched. *Fins*—first dorsal commences above the first third of the pectoral fin, its anterior spine strong, and 1/2 as long as the head. Ventral spine movable. Caudal truncated or undulated, second dorsal and anal of moderate height. *Scales*—entirely cover cheeks. Some osseous scutes behind the gill-opening: 6 to 8 rows of small recurved

spines on the side of the tail. *Colours*—of a rich brown, lips yellow and a yellow ring behind the lips: caudal dark, with a light upper and lower edge, and a white posterior extremity: second dorsal and anal yellow.

Habitat.—Red Sea, seas of India to the Malay Archipelago. The example figured (life-size) was from the Malay Archipelago, and for it I am indebted to Dr. Hubrecht, of Leyden.

5. Balistes mitis, Plate CLXXVII, fig. 3.

Baliste bridé, Lacép. i, pp. 335, 381, pl. xv, f. 3; Cuvier, Règ. Anim.

Balistes, Russell, Fish. Vizag. i, p. 13, and *Rahtee Yellakah*, f. xx.

Balistes Amboinensis, Gray and Hardw. Illust. Ind. Zool. (from Reeves' MSS.)

Balistes mitis, Bennett, Proc. Zool. Soc. 1831, i, p. 169; Günther, Catal. viii, p. 218.

Rhinecanthus Amboinensis, Swainson, Fishes, ii, p, 325.

Pachynathus triangularis, Swainson, Fishes, ii, p. 326.

Balistes capistratus, Lacép. ed. Pillot, vi, p. 126 (not Tiles).

Balistes triangularis, Bleeker, Beng. p. 78.

Balistes frenatus, Richards. Voy. Sulphur, Fish. p. 129, pl. lx, f. 1, and Ich. China, p. 201; Kaup, Sclerod. p. 224; Hollard, Ann. Sc. Nat. 4th Series, i, p. 322, t. v, f. 3; Bleeker, Manado, p. 74, and Atl. Ich. v, p. 114, t. ccxxiii, f. 2; Kner, Novara Fische, p. 400.

Balistes hippé, Richard. l. c. p. 127, pl. lx, f. 2, and Ich. China, p. 200.

Balistes Schmittii, Bleeker, Balist. p. 37, and Sumatra, p. 532.

B. vi, D. 3/29-31, P. 14, A. 26-28, C. 13, L. l. 55-65.

Length of head $3\frac{1}{2}$, of caudal fin 6, height of body $2\frac{1}{4}$ in the total length. *Eyes*—diameter from $3\frac{1}{2}$ to $4\frac{1}{2}$ from the end of the snout, and $1\frac{1}{4}$ to $1\frac{1}{2}$ apart. A well marked groove in front of the eye. *Teeth*—8 in either jaw: compressed, notched, increasing in size anteriorly. *Fins*—first dorsal commences over the posterior edge of the orbit, its spine coarse, rather more than half of the length of the head: second dorsal and anal of moderate height. Caudal with its posterior edge sinuous or truncated. *Scales*—cover cheeks: some enlarged scutes behind the gill-opening: each scale in the caudal region with a round tubercle most distinct on 7 or 8 rows in the middle of the side. *Colours*—dull yellowish-brown: pectoral and ventral spine straw coloured, the other fins blackish with lighter bases, which posteriorly have a yellowish tint: ventral rays and membrane dark. A yellow band passes from round the mouth towards the base of the pectoral fin.

Habitat.—East coast of Africa, seas of India to the Malay Archipelago, and beyond.

6. Balistes conspicillum.

Balistes Americanus (? Gmel. Linn. p. 1473), Lacép. i, p. 375, t. xvi, f. 2.

Balistes conspicillum, Bl. Schn. p. 474; Less. Voy. Coq. Zool. ii, p. 112, t. ix, f. 1; Quoy and Gaim. Voy. Uranie, t. ix, f. 1; Cuv. Règ. Anim.: Cantor, Catal. Mal. Fish. p. 344; Temm. and Schleg. Fauna Japon. Poiss. p. 289, t. cxxix, f. 1; Richards. Ich. China, p. 201; Bleeker, Celebes, p. 780, and Atl. Ich. v, p. 116, t. ccxxi; Kaup, Sclerod. p. 223; Kner, Novara Fische, p. 400; Hollard, Ann. Sc. Nat. 1854, i, p. 326; Günther, Catal. viii, p. 220.

Balistes bicolor, Shaw, Zool. v, pt. 2, p. 407.

Rhinecanthus conspicillum, Swainson, Fishes, ii, p. 325.

B. vi, D. 3/25-26, P. 14, A. 20-22, C. 12, L. l. 44-54, L. tr. 27-31.

Length of head $3\frac{1}{2}$, of caudal fin 7 to 8, height of body $2\frac{1}{4}$ to $2\frac{2}{3}$ in the total length. *Eyes*—diameter 4 to $4\frac{1}{2}$ in the length of the snout. A groove in front of the eye. *Teeth*—white, compressed, notched. *Fins*—first dorsal commences above the gill-opening: its spine coarse and about 1/2 as long as the head: second dorsal and anal rather low. Ventral spine short, movable. Caudal rounded. *Scales*—covering cheeks and snout: some osseous scutes behind the gill-opening: $2\frac{1}{2}$ or 2 whole and 2 half rows of tubercles on the side of the tail. *Colours*—brownish, with large round white or yellow blotches along the lower half of the body: below the first dorsal fin a light patch in which are numerous dark spots. A white band across the snout from eye to eye: a light ring round the mouth, with a narrow one behind it. Caudal fin with a dark band in its outer fourth edged with white.

Habitat.—Indian and Pacific Oceans.

7. Balistes viridescens, Plate CLXXVII, fig. 2.

Baliste verdâtre, Lacép. i, pp. 335, 378, t. xvi, f. 3.

Balistes viridescens, Bl. Schn. p. 477; Rüpp. Atl. Fische, p. 30; Bleeker, Nat. Tyds. Ned. Ind. vii, p. 375, and Atl. Ich. v, p. 112, t. ccxxxi, f. 2; Holl. Ann. Sc. Nat. 1854, i, p. 324; Günther, Catal. viii, p. 220; Klunz. Fische Roth. Meer. 1871, p. 625.

B. vi, D. 3/24-26, P. 14, A. 23-24, C. 12, L. l. 30-34, L. tr. 17.

Length of head $3\frac{1}{3}$, of caudal fin 7, height of body $2\frac{1}{2}$ to $2\frac{1}{3}$ in the total length. *Eyes*—diameter $3\frac{1}{2}$ in length of snout, $1\frac{1}{2}$ diameters apart. A groove in front of the eye. *Teeth*—white, compressed, notched. *Fins*—first dorsal commences above the gill-opening, its spine coarse and about 1/2 as long as the head: soft dorsal and anal rather elevated. Ventral spine short. Caudal truncated or rounded. *Scales*—covering cheeks and snout: some osseous scutes behind the gill-opening. Four and a half rows of recurved spines on the side

of the tail. *Colours*—a light ring round the muzzle joining one from below, and dividing the black lip from a black band on the forehead: body brownish olive, each scale darkest in the centre: a wide blackish band from the eye to the base of the pectoral fin: vertical fins yellowish with dark margins, having sinuous lines on them: large blue blotches on the first dorsal fin, sometimes the base of the caudal is dark.

Habitat.—Red Sea, East coast of Africa, Andamans to the Malay Archipelago.

8. Balistes fuscus, Plate CLXXVIII, fig. 4.

Baliste grande-tache, Lacép. i, p. 378.
Balistes fuscus, Bl. Schn. p. 471; Günther, Catal. viii, p. 222; Klunz. Fisch. Roth. Meer. 1871, p. 623.
Balistes signatus, Shaw, Zool. v. pt. 2, p. 416.
Balistes rivulatus, Rüpp. N. W. Fische, p. 56, t. xvi, f. 2: Günther, Catal. viii, p. 222.
Balistes cærulescens, Rüpp. Atl. p. 32, t. vii, f. 2 (young).
Balistes reticulatus, Hollard, An. Sc. Nat. i, 1854, p. 312.
Balistes chrysospilus, Bleeker, Solor, p. 94, and Atl. Ich. v, p. 111, t. ccxxv, f. 3.

B. vi, D. 3/25-26, P. 14, A. 23-26, C. 12, L. l. 45-55, L. tr. 27-31.

Length of head $3\frac{1}{2}$, of caudal fin 7, height of body $2\frac{1}{4}$ in the total length. *Eyes*—$2\frac{1}{2}$ diameters from the end of snout and 1 apart. Cheeks with naked grooves. *Teeth*—compressed and notched. *Fins*—dorsal commences above base of pectoral fin, its spine strong and 2/3 of the length of the head. Ventral spine movable. Caudal rounded in the young, truncate in the immature, deeply emarginate in the adult with the outer rays often prolonged. Second dorsal and anal fins well developed. *Scales*—those on the cheeks in the form of osseous tubercles, placed in rows at a short distance apart: some osseous scutes behind the gill-opening: no spines on the side of the tail. *Colours*—dull yellow, with vertical brown stripes and spots, which sometimes enclose spaces. Three dark narrow interorbital bands. Vertical fins spotted with dark in the young, with yellow in the adult. Old examples brown, with the vertical fins light edged.

Habitat.—Red Sea, East coast of Africa, seas of India to the Malay Archipelago. The example figured (life-size) was from Ceylon. It attains upwards of a foot and a half in length.

9. Balistes flavimarginatus,* Plate CLXXVIII, fig. 1.

Rüpp. Atl. Fische, p. 33, N. W. Fische, p. 54, t. xv, f. 1-2; Bleeker, Mol. p. 303, and Atl. Ich. v, p. 113, t. ccxviii, f. 3, and t. ccxxiv, f. 3; Peters, Fisch. Mossam. p. 276; Günther, Catal. viii, p. 223; Klunz. Fish. Roth. Meer. 1871, p. 626.
Melichthys marginatus, Swainson, Fishes, ii, p. 325.
Balistes Beeri, Bleeker, Celebes, p. 53.

B. vi, D. 3/26-27, P. 15, A. 23-24, C. 14, L. l. 30-35, L. tr. 19-21.

Length of head $3\frac{2}{3}$, of caudal fin $6\frac{2}{3}$, height of body $2\frac{1}{4}$ in the total length. *Eyes*—$3\frac{1}{2}$ diameters from end of snout and $1\frac{1}{2}$ apart. A groove in front of the eye. *Teeth*—compressed and notched. *Fins*—first dorsal commences above the gill-opening, its anterior spine stout. Ventral spine movable. Caudal rounded in the very young, truncated in the immature, deeply concave and having the lobes produced in adults. Second dorsal and anal well developed. *Scales*—anterior part of snout partly covered with tubercular rudimentary scales, in the adult the cheeks are not entirely scaled: a few scutes behind the gill-opening. Four to six rows of rather small recurved spines of the side of the tail. *Colours*—superiorly of a bluish stone, becoming lighter on the sides and below, where it becomes of a buff colour. The lower surface of mouth and chest orange, fading into yellow: immature with dark spots in the centre of some of the scales: vertical fins with a dark base and a light outer half along the centre of which is a dark band. Adults become of a nearly uniform colour.

Habitat.—Red Sea, Andamans to the Malay Archipelago. The largest example personally captured was 20 inches in length. *Balistes Brasiliensis*, Bl. Schn. p. 470, is considered by Dr. Peters to be this species.

10. Balistes aculeatus, Plate CLXXVIII, fig. 3.

Linn. Syst. Nat. i, p. 406; Bloch. t. 149; Gmel. Linn. p. 1466; Bonn. Ich. p. 18, t. xi, f. 35; Bl. Schn. p. 465; Cuv. Règ. Anim.; Lacép. i, p. 367, t. xvii, f, 1; Swainson, Fishes, ii, p. 324; Bennett, Beechey's Voy. Blossom, Zool. p. 69, pl. xxii, f. 2; Jenyns, Voy. Beagle, Fish. p. 155; Bleeker, Balist. p. 15, and Atl. Ich. v, p. 120, t. ccxvi, f. 3; Rich. Voy. Samarang, Fish. p. 24; Peters, Fisch. Mossam, p. 276; Hollard, Ann. Sc. Nat. i, 1854, p. 333; Günther, Catal. viii, p. 223.
Balistes verrucosus, Bonn. Ich. p. 18.

* Amongst Sir Walter Elliott's drawings of fish from Madras, is a beautiful and as I believe unnamed *Balistes*: it is thus referred to by Jerdon (Madr. Journ. Lit. and Science, 1851, p. 149), "*Balistes*—? *Varri korawa*, Tamil. Greenish, with red longitudinal stripes: caudal red and yellow." The figure is $8\frac{1}{2}$ inches in length. A groove in front of snout. *Fins*—second dorsal and anal rather high anteriorly: caudal deeply lunated. *Scales*—cover cheeks. *Colours*—olive dashed with green along the back and sides, becoming light on the abdominal surface: four purplish bands along the cheek: numerous narrow purple bands extend obliquely along the whole length of the body, the superior ones ending along the dorsal profile, the inferior being broken up. Vertical fins bluish, with a dark band along the base of each: caudal light gray, with carmine outer edges and posteriorly carmine edged with yellow.

Balistes ornatissimus, Less. Voy. Coq. Poiss. i, p. 119, t. x, f. 1.
Rhinecanthus ornatissimus, Swainson, Fishes, ii, p. 325.
Balistes armatus, Cuv. Règ. Anim.
Balistes striatus, Gronov. ed. Gray, p. 32.
Balistrapus verrucosus, Kaup, Sclerod. p. 226. (not Linn.)

B. vi, D. 3/24-25, P. 14, A. 21-22, C. 12, L. l. 38-40, L. tr. 22.

Length of head $3\frac{1}{4}$, of caudal fin 7, height of body $2\frac{2}{3}$ in the total length. *Eyes*—5 diameters from the end of snout and $1\frac{1}{3}$ apart: no groove in front of eye. *Teeth*—compressed, notched, those in centre of lower jaw longer than those in the upper. *Fins*—first dorsal commences above the gill-opening, its anterior spine strong and about 1/2 as long as the head. Ventral spine movable. Caudal rounded in the young, undulated in the adult. Second dorsal and anal of moderate height. *Scales*—entirely cover the cheeks: some osseous scutes behind the gill-opening. Two and a half rows of recurved spines on the side of the tail. *Colours*—grayish, with a large dark blotch along the side of the body and extending to the anal fin. Four dark blue interocular bands divided by three black ones: three blue lines pass from the eye to the base of the pectoral, the two first being separated by a black band: an orange band goes from the angle of the mouth to the same place: four or five oblique white bands pass from the middle of the body to the anal fin: caudal spines black and situated on a white base.

Habitat.—Red Sea, East coast of Africa, seas of India to the Malay Archipelago, and beyond.

11. Balistes rectangulus, Plate CLXXVIII, fig. 2.

Baliste écharpe, Lacép. i, pp. 333, 352, t, xvi, f. 1; Cuv. Règ. Anim.

Balistes rectangulus, Bl. Schn. p. 465; Cuv. Règn. Anim.: Guer. Ménev. Icon. Reg. An. Poiss. t. ccvi, f. 2; Richards. Voy. Samarang, Zool. p. 24; Kaup, Sclerod. p. 226; Günther, Fish. Zanz. p. 134.

Balistes medinilla, Quoy and Gaim. Voy. Uranie, i, p. 206, Poiss. t. xlvi, f. 2; Swainson, Fishes, ii, p. 324, f. 103.

Balistes erythropteron, Lesson, Voy. Coq. Zool. ii, p. 123, t. x, f. 3.

Balistapus rectangulus, Kaup, Sclerod. p. 226.

Balistes cinctus, Bleeker, Amboina, p. 96, and Atl. Ich. v, p. 119, t. ccxxviii, f. 1; Hollard, Ann. Sc. Nat. 1854, i. p. 335.

B. vi, D. 3/23, P. 14, A. 20-22, C. 12, L. l. 42, L. tr. 24-28.

Length of head 3, of caudal fin 8, height of body $2\frac{3}{4}$ in the total length. *Eyes*—5 diameters from the end of snout and 2 apart. No groove in front of the eye. *Teeth*—compressed and notched. *Fins*—first dorsal commences above the gill-opening, its anterior spine strong, and 2/5 of the length of the head. Ventral spine movable. Caudal slightly rounded or cut nearly square. Second dorsal and anal of moderate height. *Scales*—entirely cover the cheeks: some osseous plates behind the gill-opening: $3\frac{1}{2}$ rows of recurved spines on either side of the tail. *Colours*—olive, a black band edged with blue passses from below the eye and widening is continued to the vent and along the anterior two-thirds of the base of the anal fin: in front of this band a yellow one, also having a blue outer edge, passes from the eye to the anterior portion of the base of the pectoral fin: another narrow black band edged with blue passes from behind the gill-opening towards the end of the soft dorsal: a black angular band edged with blue, the angle pointing forwards, exists on the free portion of the tail, extending forwards nearly to the middle of the base of the anal fin. Three very narrow black interocular bands, dividing four wider blue ones. A light blue band edged with black across the snout: fins light coloured, first dorsal bluish, with a light outer edge, which has a narrow brown base and a black outer margin: pectoral with a black base.

Habitat.—East coast of Africa, seas of India to the Malay Archipelago and beyond. The example figured ($7\frac{1}{2}$ inches in length) was from the Malay Archipelago, and for it I am indebted to Dr. Hubrecht, of Leyden.

12. Balistes undulatus, Plate CLXXVII, fig. 4.

Mungo Park, Trans. Linn. Soc. iii, p. 37; Lacép. iv, p. 682; Günther, Catal. viii, p. 226; Klunz. Fische Roth. Meer. 1871, p. 629.

Balistes aculeatus minor, Forsk. Desc. Anim. p. xvii, No. 47.

Balistes lineatus, Bl. Schn. p. 466, t. 87; Rüppell, Atl. Fische, p. 29; Richards. Ich. China, p. 318; Bleeker, Beng. p. 78, Balist. p. 14, and Atl. Ich. v, p. 118, t. cxxix, f. 2; Peters, Fisch. Mossam. p. 276; Holl. Ann. Sc. Nat. 4th Series, i, p. 337; Kner, Novara Fische, p. 400.

Balistes aculeatus (*β. viridis*), Bennett, Fish. Ceylon, p. 10, pl. x.

Balistes capistratus, Tiles, Mém. Acad. Sc. St. Pétersb. vii, p. 301, t. ix.

Balistes Lamourouxii, Quoy and Gaim. Voy. Uranie, Zool. p. 208, t. xlvii, f. 1; Swainson, Fishes, ii, p. 324.

Rhinecanthus lineatus, Swainson, Fishes, ii, p. 325.

Balistes sesquilineatus, Bennett, Beechey, Voy. Blossom, p. 69, pl. xxi, f. 3.

Balistes porcatus, Gronov. ed. Gray. p. 32.

Mol-kotah, "Rice pounder," Cingalese.

B. vi, D. 3 25-26, P. 14, A. 22, C. 12, L. l. 40, L. tr. 23-26.

Length of head $3\frac{3}{4}$, of caudal fin $6\frac{1}{3}$, height of body $2\frac{1}{3}$ in the total length. *Eyes*—high up and not above 1/2 a diameter from posterior end of head, $1\frac{1}{2}$ diameters apart. No groove in front of eye. *Fins*—second dorsal and anal fins rather low, the corners rounded. Ventral spine movable. Posterior edge of caudal fin convex or undulated. *Scales*—cheeks entirely scaly: a patch of a few enlarged scutes behind the gill-opening: 4 to 6 strong spines on either side of the tail in two rows. *Colours*—brownish, with numerous undulating yellow lines from the eye and back to the anal and caudal fins: three or four likewise pass from the angle of the mouth and lips to between the ventral and anal fins: a dark band along the base of the second dorsal and anal: and a black margin to interspinous membrane between first and second dorsal spines. In some examples a black blotch exists at the side of the tail near the base of the caudal fin.

Habitat.—Red Sea, East coast of Africa, seas of India to the Malay Archipelago, and beyond. The example figured (a skin 10 inches in length) was from the Andamans.

13. Balistes erythrodon, Plate CLXXV, fig. 4.

Baliste noir, Lacép. i, pp. 378, 380, t. xv, f. 2.
Xenodon niger, Rüpp. N. W. Fische, p. 53, t. xiv, f. 3; Bleeker, Balistes, p. 37 (not Mungo Park).
Erythrodon niger, Rüpp. Verz. Fisch. Senck. Mus. p. 34; Bleeker, Atl. Ich. v, p. 106, t. ccxix.
Zenodon niger, Swainson, Fishes, ii, p. 325.
Pyrodon niger, Kaup, Sclerod. p. 222; Bleeker, En. Pisc. p. 193.
Balistes niger, Hollard, Ann. Sc. Nat. 1854, i, p. 315.
Balistes erythrodon, Günther, Catal. viii, p. 228; Klunz. Fisch. Roth. Meer. 1871, p. 631.

B. vi, D. 3/35, P. 14, A. 30, C. 12, L. l. 33-35, L. tr. 17.

Length of head $4\frac{1}{2}$, of caudal fin $3\frac{3}{4}$, height of body 3 in the total length. *Eyes*—3 diameters from end of snout and $1\frac{1}{2}$ apart. A shallow scaly groove in front of eye. Lower jaw projecting. *Teeth*—reddish-brown, strongly compressed, notched: the tooth on the side of the central pair in the upper jaw considerably projecting. *Fins*—first dorsal commences above the gill-opening, its spine strong and about 1/2 as long as the head. Ventral spines movable. Caudal deeply concave, with its outer rays prolonged. Second dorsal and anal elevated, especially anteriorly. *Scales*—cheeks entirely scaly: some enlarged scutes behind the gill-opening. Scales roughened, those along the middle of the body and tail with a small elevated tubercle on each, but no prominent spines. *Colours*—of a deep brown, a black stripe after encircling the mouth goes to the base of the pectoral fin. Vertical fins nearly black, the caudal with a white posterior edge.

Habitat.—Red Sea, East coast of Africa, seas of India to the Malay Archipelago. The example figured (life-size) was from Mangalore, where it was procured by Dr. Dobson.

Genus, 3—Monacanthus, *Cuvier.*

Alutarius, Cuv.: *Stephanolepis*, Gill: *Chætodermis*, *Paramonacanthus*, *Amanses*, Gray: *Pseudomonacanthus*, *Liomonacanthus*, *Oxymonacanthus*, *Branchaluteres*, *Acanthaluteres*, *Ceratacanthus*, *Paraluteres*, *Pseudaluteres* and *Aluteres*, Bleeker.

Body compressed. Barbels absent. Incisoriform teeth in both jaws, in two rows in the upper with six in the outer row, and a single row of six in the mandibles. The first dorsal fin composed of a spine which may be feeble or strong and merely rough, or provided posteriorly or laterally with barbs, occasionally a second rudimentary one: ventral fin, when present, reduced to a single osseous process, sometimes rudimentary and either movable or fixed. Scales minute and rough: cutaneous filaments present in some species: the side of the tail may be peculiarly armed in adult males, but less apparently so or not at all in the females. Vertebræ 7/11-14.

SYNOPSIS OF INDIAN SPECIES.

A.—*Dorsal spine with only 2 rows of barbs, pointing backwards and downwards.*

1. *Monacanthus setifer*, D. 1/28-34, A. 29-33. Second dorsal fin with its first ray prolonged. Brownish, marbled and streaked with darker. Indian and Atlantic Oceans.

2. *Monacanthus choirocephalus*, D. 1/28, A. 28-30. Fleshy tentacles over body. Seas of India to the Malay Archipelago.

B.—*Dorsal spine rough but barbless.*

3. *Monacanthus monoceros*, D. 1/46-48, A. 48-53. Snout moderately produced, with its upper profile convex. Indian Ocean and Atlantic portions of tropical America.

4. *Monacanthus scriptus*, D. 1/44-48, A. 47-52. Snout produced with its upper profile concave. Indian Ocean.

A.—*Dorsal spine with only 2 rows of barbs, pointing backwards and downwards.*

1. Monacanthus setifer.

Bennett, Proc. Zool. Soc. 1831, p. 112; Hollard, Ann. Sc. Nat, 1854, ii, p. 342, pl. xii, f. 4; Dekay, New York Fauna, Fish. p. 337, pl. lix, f. 194; Günther, Catal. viii, p. 239.

Monacanthus cirrifer, Temm. and Schlegel, Fauna Japon. Poiss. p. 290, t. cxxx, f. i; Bleeker, Japan, p. 31.

Monacanthus varius, Ranzani, Nov. Comm. Ac. Sc. Inst. Bonon. 1842, v, p. 6, t. ii.

Monacanthus broccus, Storer, Proc. Bost. Soc. Nat. Hist. 1842, p. 84 (not Mitchell).

Monacanthus filamentosus and *gallinula*, Val. in Webb and Berthal. Iles Canar. Poiss. p. 95, pl. xvii, f. 1.

Monacanthus signifer, Storer, Mem. Am. Ac. ii, 1846, p. 497, and viii, p. 426, t. xxxv, f. 1.

Monacanthus auriga, Lowe, Proc. Zool. Soc. 1854, p. 253.

Monacanthus Massachusettensis, Storer, Fish. Mass. p. 174, and Mem. Am. Ac. viii, p. 425, t. xxxiv, f. 4; Dekay, l. c. p. 336, t. lvii, f. 187.

Monacanthus komuki, Bleeker, l. c. t. iii, f. 3, and Japan, p. 13, c. fig.

Monacanthus auratus, Castelnau, Poiss. Afr. Austr. p. 77.

B. vi, D. 1/28-34, P. 12, A. 29-33, C. 9.

Length of head $3\frac{1}{4}$ to $3\frac{2}{3}$, of caudal fin $4\frac{1}{2}$, height of body $2\frac{1}{3}$ to $2\frac{2}{3}$ in the total length. *Eyes*—situated in the posterior half of the head, 2 to $2\frac{1}{4}$ diameters from the end of snout. Body elevated. *Fins*—the first dorsal situated above the posterior portion of the eye, and at the highest point of the dorsal profile: the spine may be strong or weak, prolonged or not so. Second dorsal having its anterior ray occasionally with a filamentous prolongation. Ventral spine small, movable, attached to the abdominal membrane. Caudal rounded. *Scales*—present but small, the skin appears as if it were velvety. *Colours*—of a dull brown, with dark blotches and streaks: caudal fin with two dark vertical bands.

Habitat.—East coast of Africa, seas of India to China and Japan: also tropical and sub-tropical parts of the Atlantic.

2. **Monacanthus choirocephalus**, Plate CLXXIX, fig. 3.

Bleeker, Balist. p. 19, pl. ii, f. 4; Günther, Catal. viii, p. 242.

Paramonacanthus choirocephalus, Bleeker, Atl. Ich. v, p. 131, t. ccxxvii, f. 3.

B. vi, D. 1/28, P. 13, A. 28-30, C. 12.

Length of head $3\frac{1}{2}$, of caudal fin 5, height of body $2\frac{2}{3}$ in the total length. *Eyes*—situated in the posterior half of the head over the gill-opening and below the dorsal spine: $2\frac{1}{4}$ diameters from the end of snout and 1 apart. Body rather elevated, profile from snout to first dorsal fin almost straight. The origin of the second dorsal fin is at nearly the highest point of the dorsal profile. *Fins*—dorsal spine situated over the last 1/2 of the eye, rather weak, rough anteriorly, and with a row of small barbs on either side of its posterior surface. Second dorsal and anal with the first few rays rather shorter than the succeeding ones. Ventral spine movable, without any enlarged spines at its termination. Caudal rounded, sometimes with a setiform prolongation of one of its upper rays. *Scales*—indistinctly visible, skin not very rough: numerous small fleshy tentacles on the sides of the body. *Colours*—of a gray stone-colour, with irregular and rather large black blotches: two dark bands across the caudal fin.

This species is not rare at Madras. It differs from the form described by Bleeker in having numerous fleshy appendages over the body.

Habitat.—Madras to the Malay Archipelago.

B.—*Dorsal spine rough but barbless.*

3. **Monacanthus monoceros**, Plate CLXXIX, fig. 2.

Balistes monoceros, Osbeck's Voy. transl. by Forster, 1771, i, p. 173; Linn. Syst. Nat. i, p. 404; Bloch. t. 147; Bonn. Ich. p. 17, t. x, f. 34; Gmel. Linn. p. 1462, var. a.; Bl. Schn. p. 462; Lacép. i, p. 386.

Lija barbuda, Parra, p. 48, t. xxii, fig. 2.

Balistes Kleinii, Gmel. Linn. p. 1472.

Balistes monoceros, var. *unicolor*, Bl. Schn. p. 463.

Balistes serraticornis, Fréminv. Nouv. Bull. Sc. Soc. Philom. No. 67, p. 249, t. iv, f. 1.

Aleuteres Berardi, Less. Voy. Coq. Zool. p. 107, t. vii; Richards. Voy. Sulphur, Ich. p. 132, pl. lxi, f. 1, and Ich. China, pp. 202, 318; Jerdon, M. J. L. and Sc. 1851, p. 149.

Aluteria cinerea, Temm. and Schleg. Fauna Japon. Poiss. p. 292, t. cxxxi, f. 1.

Alutera monoceros, Swainson, Fishes, ii, p. 327.

Alutarius amphacanthoides and *macracanthus*, Bleeker, Balist. pp. 22, 23, t. ii, f. 5, and t. iii, f. 6.

Alutarius obliteratus, Cantor, Catal. Malay. Fish. p. 353 (*young*).

Balistes linguatula, Gronov. Syst. ed. Gray, p. 35.

Aluterus anginosus, Hollard, Ann. Sc. Nat. 1855, iv, p. 11.

Alutera Güntheriana, Poey, Proc. Ac. Nat. Sc. Phil. 1863, p. 184.

Aleuteres monoceros, Cuv. Règn. Anim.; Bleeker, Atl. Ich. v, p. 140, t. ccxxvi, f. 2.

Monacanthus monoceros, Günther, Catal. viii, p. 251.

B. vi, D. 1/46-48, P. 14, A. 48-53, C. 12.

Length of head about 4, of caudal fin 8, height of body from $2\frac{3}{4}$ to $3\frac{1}{3}$ in the total length. *Eyes*—rather

small, situated between the upper end of gill-opening and first dorsal fin. Body oblong, snout moderately produced with its upper profile convex. *Fins*—vertical ones low: dorsal spine weak. No ventral spine. Caudal truncated or very slightly convex. *Colours*—brownish or blackish, the fins yellow.

This fish "looks like a flounder at a distance, and has almost the same taste, but is not so fat," Osbeck, l. c.

Habitat.—East coast of Africa, seas of India to the Malay Archipelago and Japan: Atlantic portions of tropical America. An example in the Madras museum is 15 inches in length. The specimen figured was from the Andaman Islands.

4. Monacanthus scriptus, Plate CLXXX, fig. 3.

Balistes scriptus, Osbeck's Voyage, translated by Forster, i, p. 174.
Lija trompa, Parra, p. 46, t. xxii, fig. 1.
Balistes lævis, Bl. Ausl. Fisch. t. ccccxiv.
Balistes monoceros var. *lævis*, Bl. Schn. p. 463.
Alutarius lævis, Cuv. Règne An.; Swainson, Fishes, ii, p. 327; Cant. Mal. Fish. p. 355; Bleek. Beng. p. 80, and Balist. p. 22; Jerdon, M. J. L. and Sc. 1851, p. 149; Hollard, Ann. Sc. Nat. 1855, iv, p. 15; Day, Fish. Malabar, p. 259.
Balistes ornatus, Marion de Procé, Bull. Philom. 1822, p. 131.
Aluteres pareva, Less. Voy. Coq. Zool. p. 106.
Monacanthus proboscideus, Ranzani, Nov. Comm. Ac. Sc. Inst. Bonon. v, 1842, p. 8.
Aleuteres lævis, Richards. Voy. Sulph. Ichth. p. 131, pl. 61, fig. 3, and Ich. China, p. 202.
Aluterius venosus, Hollard, Ann. Sc. Nat. 1855, iv, p. 14, pl. i, fig. 3.
Alutera picturata, Poey, Proc. Ac. Nat. Sc. Philad. 1863, p. 183.
Aluteres scriptus, Bleek. Atl. Ichth. v, p. 141, pl. ccxxvii, fig. 4.
Monacanthus scriptus, Günther, Catal. viii, p. 252; Klunz. Fische Roth. Meer. 1871, p. 632.

B. vi, D. 1/44-48, P. 15, A. 47-52, C. 12.

Length of head 4 to $4\frac{1}{4}$, of caudal fin $3\frac{1}{3}$ to $3\frac{2}{3}$, height of body $4\frac{1}{4}$ in the total length. *Eyes*—of moderate size, situated between the upper end of the gill-opening and the first dorsal fin. Body oblong, snout produced, with its upper profile concave. *Teeth*—8, compressed and pointed. *Fins*—vertical ones low, dorsal spine weak and of moderate length. No ventral spine. Caudal wedge-shaped. *Colours*—buff, covered with small brown spots and blue lines.

Habitat.—Red Sea, East coast of Africa, seas of India to the Malay Archipelago, and beyond: attaining at least two feet in length. The example figured (stuffed) 12 inches long, was from Madras.

Genus, 4—Anacanthus, *Gray*.

Psilocephalus, Swainson: *Pogonognathus*, Bleeker.

Body compressed, elongated. A fleshy barbel below the symphysis of the lower jaw. Incisoriform teeth in both jaws, in two rows in the upper and one row in the lower jaw. The first dorsal in the form of a single flexible spine: the second and the anal with many rays: ventral fin absent. Body covered with fine asperities. Vertebræ 29-30.

Geographical distribution.—Seas of India to the Malay Archipelago, and beyond.

Anacanthus barbatus, Plate CLXXIX, fig. 1 (*Female*).

Balistes (*Anacanthus*) *barbatus*, Gray and Hardw. Ill. Ind. Zool. (*Male*).
Alatarius barbatus, Cantor, Catal. Malay. Fish. p. 357, pl. viii, fig. 1 (*Female*).
Pogonognathus barbatus, Bleeker, Celebes, p. 73, and Balist. p. 24, t. v, f. 11.
Psilocephalus barbatus, Swainson, Fishes, ii, p. 327; Bleeker, Atl. Ich. v, p. 143, t. ccxxvi, f, 1 (*Male*).
Aluterus barbatus, Hollard, Ann. Sc. Nat. 1855, iv, p. 17, t. i, f. 4 (*Female*).
Anacanthus barbatus, Gray, Zool. Misc. 1831, p. 8; Günther, Catal. viii, p. 255.

Crassi kola and *Watamoo kola*, Tamil.

B. iii, D. 1/49-52, P. 10, A. 57-64, C. 12.

Length of the head about 1/3 of that of the body excluding the caudal fin. *Eyes*—high up, behind and above the branchial opening. Body strongly compressed, with a fleshy barbel below the symphysis of the lower jaw. In the *male* there is a skinny prolongation from the throat and continued nearly as far as the anal fin, it is supported by a prolongation of the pelvic bone. *Fins*—second dorsal and anal low: caudal wedge-shaped, its central rays the longest. *Colours*—dull brown or gray, fins yellow, the caudal with about six vertical or angular dark bands not so wide as the ground colour.

Habitat.—Seas of India to the Malay Archipelago. Is very common at Madras, especially the young. It attains at least 10 inches in length.

Third group—Ostraciontina.

Body angular, with the dermal covering forming a carapace, leaving the snout and bases of the fins covered by skin. Spinous dorsal and ventral fins absent, except in the form of osseous protuberances.

Genus, 5—OSTRACION, *Artedi.*

Lætophrys, *Tetrosomus* and *Rhinesomus*, Swains.: *Acanthostracion*, Bleeker: *Cibotion*, Kaup.

Branchiostegals six. Body shortened and angular, with the integuments modified into a solid carapace composed of angular osseous plates in juxtaposition with one another, but leaving the snout, bases of the fins, and the hind portion of the tail, covered by soft skin. They may be destitute of spines or have them variously situated. The carapace from three to five ridged, and closed behind the anal fin. Mouth small, premaxillaries and maxillaries coalescent. Teeth slender and in one row. A single spineless dorsal fin placed opposite the anal. Ventrals absent.

These fishes with their hard, box-like outer covering and angular form are easily recognised, and although the species differ widely amongst themselves, the intermediate forms preclude the possibility of subdividing them into Genera.* The spines observed on some of the species vary with the age of the individual.

SYNOPSIS OF SPECIES.

a.—Carapace 3-ridged, with or without spines.

1. *Ostracion turritus.* A compressed triangular dorsal, also a supraorbital spine: each ventral ridge with 4 spines. A blue spot in each scute. Red Sea, seas of India to the Malay Archipelago.

b.—Carapace 4 or 5-ridged, spineless.

2. *Ostracion cubicus.* No median dorsal ridge. A blue black-edged ocellus in the centre of most of the scutes. Red Sea, seas of India to the Malay Archipelago, and beyond.
3. *Ostracion punctatus.* No median dorsal ridge. Numerous white dots, sometimes confluent into lines. East coast of Africa, seas of India to the Malay Archipelago, and beyond.
4. *Ostracion nasus.* A median dorsal ridge. Black spots irregularly scattered over the body. Seas of India to the Malay Archipelago, and the Pacific.

c.—Carapace 4-ridged, spines present.

5. *Ostracion cornutus.* A supraorbital forwardly directed spine, and a similar one directed backwards at the posterior extremity of each ventral ridge. Blue and black spots on body and tail. Red Sea, seas of India to the Malay Archipelago, and beyond.

a.—Carapace 3-ridged, with or without spines.

1. Ostracion turritus, Plate CLXXXI, fig. 4.

Ostracion gibbosus, Linn. Syst. Nat. p. 1443; Gmel. Linn. p. 1443; Kaup, Sclerod. p. 218; Günther, Catal. viii, p. 258.
Ostracion turritus, Forsk. Desc. Anim. p. 75, No. 113; Bloch, t. 136; Gmel. Linn. p. 1442; Bl. Schn. p. 500; Bonn. Ich. p. 22; Lacép. i, p. 470; Cuv. Règn. Anim.; Rüppell, Atl. p. 5; Bleeker, Balist. p. 31, Japan, p. 13, and Atl. Ich. v, p. 31, t. cciii, f. 3; Jerdon, M. J. L. and Sc. 1851, p. 150; Hollard, Ann. Sc. Nat. 1857, vii, p. 156; Klunz. Fisch. Roth. Meer. 1871, p. 634.
Chameau marin, Bonn. p. 22, t. 14, f. 47.
Ostracion dromadaire, Lacép. i, p. 470.
Tetrosomus turritus, Swainson, Fishes, ii, p. 323.
Lactophrys camelinus, Dekay, New York Fauna, Fish. p. 341, t. lviii, f. 190.

Cul-planchee, Tamil.

D. 9, P. 10, A. 9, C. 10.

Carapace 3-ridged, the superior or dorsal ridge being elevated and superiorly compressed into a sharp triangular spine. Each lateral or ventral ridge well developed, and armed with 4 triangular, flattened and strong spines directed backwards. Body about as wide as high, being of a triangular shape, the apex being above. The carapace forms a moderately broad bridge across the back of the tail. A compressed supraorbital spine directed upwards or a little backwards. *Teeth*—12 in the upper and 8 in the lower jaw, conical, weak, and of a brownish colour. *Fins*—dorsal and anal highest anteriorly: caudal rounded or truncated. *Scutes*—from 9 to 11 from the gill-opening to the tail, 9 or 10 transversely: and about 11 across the ventral surface. *Colours*—olive brown, with 3 badly marked dark bands in the lower 1/3 of the body, and a fourth just behind the base of the dorsal fin. A light blue spot in the centre of each scute. Fins straw-coloured, the caudal with two dark vertical bands, one at its base, the other at its outer extremity. The young have several dark blotches and bands over various parts of the body, and a ridge extends from the orbit to the upper part of the bridge over the tail.
Habitat.—Red Sea, East coast of Africa, seas of India to the Malay Archipelago, and reported from

* Except Genus *Aracana*, Gray, which I consider to be distinct, the carapace remaining unclosed behind the anal fin, whereas it is closed in the various species of *Ostracion*.

New York. The example figured (life-size) was from Madras, where it abounds. It attains at least 9 inches in length.

b.—Carapace, 4 or 5-ridged, spineless.

2. Ostracion cubicus, Plate CLXXXI, fig. 3.

Ostracion tetragonus, Linn. Mus. Ad. Fred. p. 59; Bleeker, Atl. Ich. v, p. 39, t. cci, f. 2, and t. cciii, f. 2; Day, Fish. Malabar, p. 254; Günther, Fish. Zanz. p. 129.

Ostracion tuberculatus, Linn. Syst. Nat. i, p. 409; Gmel. Linn. p. 1443.

Ostracion cubicus, Linn. l. c. p. 410; Bloch, t. 137; Gmel. Linn. p. 1443; Lacép. i, p. 461, t. xxii, f. 1; Bonn. p. 22; Rüpp. Atl. Fische, p. 3; Cuv. Règn. Anim.; Bleeker, Balist. p. 35, t. vii, f. 14; Lefebv. Voy. Poiss. p. 238, pl. viii; Swainson, Fishes, ii, p. 323; Peters, Fische Moss. p. 275; Hollard, Ann. Sc. Nat. 1857, vii, p. 162; Günther, Catal. viii, p. 260; Klunz. Fische Roth. Meer. 1871, p. 634.

Abu senduk, Forsk. Desc. Anim. p. 17, No. 48.

Ostracion deux-tubercles, Lacép. i, p. 459.

Ostracion bituberculatus, Bl. Schneider, p. 501.

Ostracion argus, Rüppell, Atl. Fische, p. 4, f. 1 (variety); Klunz. l. c. p. 636.

Ostracion immaculatus, Temm. and Schleg. Fauna Japon. Poiss. p. 296; Bleeker, Japan, p. 55; Brevoort, Fish. Japan, p. 284.

Ostracion tesserula, Bleeker, Mol. p. 305 (not Cantor).

D. 10, P. 10, A. 10, C. 10.

Carapace 4-ridged and spineless: ridges blunt, but the ventral more prominent than the dorsal ones. Body about as wide as high: back convex, but without any distinctly raised ridge along the median line. The carapace forms a broad bridge across the back of the tail. Interorbital space concave. *Teeth*—about 10 in either jaw, conical, weak, and of a reddish-brown colour. *Fins*—dorsal and anal highest anteriorly: caudal truncated and equal to about 1/5 of the total length. *Scutes*—about 10 between the gill-opening and the tail, 5 or 6 transversely: and 5 or 6 across the ventral surface. *Colours*—brownish, with a single blue black-edged ocellus in the centre of most of the scutes: sometimes these spots are absent from some parts of the body: on the head they are frequently black, and have more than one spot on each scute. On the abdomen the spots may be white, with or without black marks: or the spots may be black or even absent. The fins yellowish and covered with black spots or immaculate.

Habitat.—Red Sea, East coast of Africa, seas of India to the Malay Archipelago, and beyond. It attains at least 18 inches in length.

3. Ostracion punctatus, Plate CLXXXI, fig. 2.

Ostracion pointillé, Lacép. i, pp. 442, 445, t. xxi, f. 1.

Ostracion punctatus, Bl. Schn. p. 501; Cuv. Règn. Anim.: Jenyns, Zool. Beagle, Fish. p. 158; Bleeker, Banda, p. 108, and Atl. Ich. v, p. 39, t. ccii, f. 4; Hollard, Ann. Sc. Nat. 1857, vii, p. 165; Günther, Catal. viii, p. 261.

Ostracion lentiginosus, Bl. Schn. p. 501.

Ostracion meleagris, Shaw, Zool. v, p. 428, t. clxxii, and Zool. Misc. t. ccliii.

Cibotion punctatus, Kaup, Sclerod. p. 216.

D. 9, P. 10, A. 10, C. 10.

Carapace 4-ridged and spineless: ridges blunt, but the ventral more prominent than the dorsal ones. Body not quite so high as wide: back rather convex, but without any ridge along the median line. The carapace forms a moderately broad bridge across the back of the tail: superior profile of snout concave. Interorbital space concave, sometimes flat. *Teeth*—about 10 in either jaw, conical, weak, and of a reddish-brown colour. *Fins*—dorsal and anal highest anteriorly: caudal truncated and equal to nearly 1/5 of the total length. *Scutes*—about 10 across the ventral surface. *Colours*—reddish-brown, covered with numerous white dots, which are sometimes confluent into lines.

Habitat.—East coast of Africa, seas of India to the Malay Archipelago, and beyond. The example figured (life-size) was from the Malay Archipelago, and I am indebted for it to Dr. Hubrecht, of Leyden.

4. Ostracion nasus.

Bloch, t. cxxxviii; Bl. Schn. p. 500; Bonn. Ich. p. 23; Lacépède, i, p. 458; Cuv. Règn. Anim.; Swainson, Fishes, ii, p. 323; Bleeker, Balist. p. 33, t. vii, f. 15, and Atl. Ich. v, p. 36, t. ccii, f. 5 (*young*), and t. cciv, f. 2 (*adult*); Hollard, Ann. Sc. Nat. 1857, vii, p. 161; Day, Fish. Malabar, p. 253; Günther, Catal. viii, p. 263.

Ostracium tesserula, Cantor, Catal. Mal. Fish. p. 367, pl. viii, f. 2, 3.

D. 9, P. 10, A. 9, C. 10.

Carapace 5-ridged and spineless: ridges rather sharp. Body wider inferiorly than high: a distinct ridge along the median line of the back. The carapace forms a broad bridge across the back of the tail: interorbital space concave, more especially in the adult when a hump exists above the mouth. *Teeth*—about

12 in the upper and 10 in the lower jaw, weak, pointed, and of a reddish-brown colour. *Fins*—dorsal and anal highest anteriorly: caudal rounded, and about 1/5 of the total length. *Scutes*—11 to 12 between the branchial opening and the base of the caudal fin: and 6 or 7 transversely: 7 or 8 across the ventral surface. *Colours*—greenish yellow, with small irregularly scattered round black spots, or one in the centre or at the side of each scute: abdomen whitish: black spots on the tail and caudal fin. The young are bright orange-yellow, with numerous black spots along the sides, and which are not situated in the centre of the scutes, some black spots also exist over the caudal and on the base of the pectoral fins: the fins are yellowish, the abdominal surface of a whitish yellow. Pupil golden.

Habitat.—Seas of India to the Malay Archipelago and the Pacific. I procured two young ones at Cochin, but have not obtained the adult. It attains to at least $8\frac{1}{2}$ inches in length.

c.—Carapace 4-ridged, spines present.

5. **Ostracion cornutus**, Plate CLXXVI, fig. 4.

Linn. Syst. Nat. p. 409; Bloch, t. 133; Gmel. Linn. p. 1443; Bl. Schn. p. 500; Lacép. i, p. 470; Shaw, Zool. v, p. 223, t. clxx; Temm. and Schleg. Fauna Japon. Poiss. p. 299, t. cxxxi, f. 4; Bleeker, Balist. p. 32, and Atl. Ich. v, p. 33, t. ccii, f. 2 (*young*), t. cciv, f. 3 (*adult*); Jerdon, M. J. L. and Sc. 1851, p. 150; Hollard, Ann. Sc. Nat. 1857, vii, p. 158; Peters, Monats. Ak. Wiss. Berl. 1868, p. 460; Günther, Catal. viii, p. 265.

Ostracion arcus, Bl. Schneider, p. 502; Bleeker, Atl. Ich. v, p. 35, t. ccii, f. 3 (*adult*), t. cciv, f. 4 (*young*).

Lactophris cornutus, Swainson, Fishes, ii, p. 324; Kaup, Sclerod. p. 217.

Ostracium cornutum, Cantor, Catal. Malay. Fish. p. 365.

Ostracion Valentini, Bleeker, Journ. Ind. Arch. 1848 (*very young*).

Martoo-plachee, Tamil.

D. 9, P. 11, A. 9, C. 10.

Carapace 4-ridged and forming a bridge across the back of the tail. A long anteriorly directed and conical supraorbital spine: and each ventral ridge terminates posteriorly with another somewhat similar one. Dorsal ridge rather elevated about the middle of its length with a low ridge, but no spine. Interorbital space very concave. *Teeth*—about 8 or 10 in either jaw, conical and weak. *Fins*—dorsal and anal highest anteriorly: caudal truncated and equal to about 1/2 the total length. *Scutes*—about 10 between the gill-opening and the tail, 5 or 6 transversely: and 7 across the ventral surface. *Colours*—carapace of a light brown, with round blue spots all over it in moderate numbers, about one on each scute, some, however, being destitute of any. Caudal blue spotted.

Amongst Sir W. Elliot's drawings is one of a variety of this species of a yellowish colour with light spots, whilst the spines are excessively elongated. It was captured at Waltair, April 1850.

Habitat.—Red Sea, East coast of Africa, seas of India, to the Malay Archipelago, and beyond.

FAMILY, II—GYMNODONTES, *Cuvier*.

Body more or less short. Some possess the means of dilating an elastic portion of the œsophagus, or an abdominal sac, with air: or this power may be entirely wanting. Bones of the upper and lower jaw in the form of a beak, having a cutting edge, and being covered with a layer of ivory-like substance in which a median suture may be present or absent. A spineless dorsal, anal and caudal exist: pectorals present: ventrals absent. Dermal covering modified into small or large spines or laminæ. Pelvic bones and air-vessel present or absent.

Most of the Indian forms of fishes included in this family are reputed to be highly indigestible as food or even virulently poisonous.

SYNOPSIS OF INDIAN GENERA.

First Group—TRIODONTINA.

Tail and caudal fin distinct. Abdomen dilatable into a large compressed sac, which is supported by an elongated pelvic bone. Air-vessel present.

1. *Triodon*. The upper jaw divided by a median suture: the lower jaw entire, p. 698.

Second group—TETRODONTINA.

Tail and caudal fin distinct. A portion of the œsophagus dilatable and may be distended with air. No pelvic bone. Air-vessel present.

A.—*Jaws with a median suture.*

2. *Xenopterus*. Dorsal and anal fins with many rays, p. 699.
3. *Tetrodon*. Dorsal and anal fins with few rays, p. 699.

B.—*Jaws without any median suture.*

4. *Diodon*. A simple nasal tentacle having a pair of lateral orifices. Body covered with stiff movable spines, p. 708.

First group—TRIODONTINA.

Tail and caudal fin distinct. Abdomen dilatable into a large compressed sac, which is supported by an elongated pelvic bone. Air-vessel present.

Genus, 1—TRIODON (*Reinw.*), *Cuvier*.

Branchiostegals six. The upper jaw with, the lower without, a median suture. Two separate nasal orifices on either side. Tail elongated, terminating in a bilobed fin: dorsal and anal with few rays. Abdomen possessing a large sac, the upper portion of which can be dilated with air, whilst it is kept distended by elongated pelvic bones. The dermal covering consisting of spinate, osseous laminæ, which are not imbricate. Air-vessel present.

Geographical distribution.—The single species of this genus at present recorded, has been taken in the seas of India and the Malay Archipelago.

Triodon bursarius.

(Reinw.) Cuv. Règn. Anim.; Griffith in Cuv. An. King. x, pl. x; Bleeker, Blootk. p. 20, and Atl. Ich. v, p. 84, t. ccxiv, f. 1; Günther, Catal. viii, p. 270.
Triodon macropterus, Less. Voy. Coq. Zool. pl. iv.

B. vi, D. 10-11, P. 15-16, A. 9-10, C. 18.

Length of head 4 to 4½, of caudal fin 7 in the total length. *Eyes*—situated in the posterior half of the head. Interorbital space rather concave. *Fins*—dorsal situated in the last half of the distance between the eye and the base of the caudal fin, and slightly in advance of the anal, both are highest anteriorly: caudal emarginate. *Colours*—dull brown, a large, irregularly shaped, black yellow- or blue-edged spot is present on the upper portion of the sac. Fins yellow.

Habitat.—Seas of India to the Malay Archipelago. It attains at least 21 inches in length.

Second group—TETRODONTINA.

Tail and caudal fin distinct. A portion of the œsophagus dilatable and may be distended with air. No pelvic bone. Air-vessel present.

A.— *Jaws with a median suture.*

Genus, 2—Xenopterus (*Bibron*), *Duméril.*

Chonerhinus, Bleeker.

Branchiostegals five. Back rounded : jaws divided by a median suture. Nostrils funnel shaped with fringed margins. Dorsal and anal fins with many rays (23 *to* 38). *Parts of the body covered with fine dermal spines, having double or treble roots.*

These fishes, like the *Tetrodons*, are able to inflate their bodies with air and float on the water, abdomen uppermost. They ascend large rivers, far above tidal influence. In some parts of Burma they are eaten, but their bites are dreaded, and the Burmese assert that where they abound should anyone fall into the water they attack him in droves, and almost immediately cause death by biting pieces out of his body. They readily take a bait either of a piece of meat or a small fish.

Xenopterus naritus, Plate CLXXXII, fig. 1.

Tetraodon naritus, Richardson, Voy. Samarang, Fish. p. 18, pl. viii (*adult*) ; Cantor, Mal. Fish. p. 383, pl. x (*young*) ; Bleeker, Blootk. p. 21, and Borneo, p. 439.

Tetrodon grandispina, Van der Hoeven, Handb. Dierk. 2nd Edit. ii, p. 275.

Xenopterus Bellangeri (Bibron), Duméril, Rev. Zool. 1855, p. 281.

Chonerhinus naritus, Bleeker, En. Pisc. Arch. Ind. p. 202, and Atl. Ich. v, p. 77, t. ccxi, f. 2 ; Blyth, J. A. S. of Beng. 1860, p. 173.

Xenopterus naritus, Günther, Catal. viii, p. 271.

B. v, D. 32-38, P. 19, A. 28-32, C. 12.

Length of head rather more than its distance from the base of the dorsal fin. *Eyes*—rather small : interorbital space broad and flat. Lips thick and fringed. *Teeth*—the lower a little larger than the upper pair. *Fins*—the length of the base of the dorsal exceeds the length of the head, it is highest in the middle, but its highest point is not equal to that of the body : anal similar to but rather smaller than the dorsal : caudal slightly emarginate. *Spines*—with 2 or 3 roots, large, rather widely separated, situated between the eye and base of the pectoral fin, above which they are continued a short distance : also present for a short distance behind that fin and along the abdominal surface nearly as far as the vent. *Colours*—pale yellow, darkest along the back and in the lower 2/3 of the dorsal fin.

Habitat.—Through the rivers and estuaries of Burma to the Malay Archipelago.

Genus, 3—Tetrodon,* *Linnæus.*

Leisomus, *Lagocephalus*, *Cirrhisomus* and *Psilonotus*, Swainson : *Kolacanthus*, Gray : *Prilonotus* and *Anchisomus*, Kaup : *Tropidichthys*, Bleeker : *Promécocéphale*, *Dilobomycterè*, *Amblyrhynchote*, *Geneion*, *Catophorhyngue*, *Batrachops*, *Rhynchote* (Bibron) Duméril : *Rhynchotus*, *Apsicephalus*, *Brachycephalus*, Hollard.

Back broad, or compressed into a ridge. Either jaw with a median suture. Should a conspicuous nasal organ exist : there may be two on either side in a papilla (Tetraodon, Bleeker) : *or a single tubular one* (*Crayracion*, Bleeker) : *or an imperforate one having a fringed edge and the body spiny* (*Chelonodon*, Müller) : *or a simple round cavity and the body smooth* (*Monotretus*, Bib.) : *or two imperforate tentacles on either side* (*Arothron*, Müll.) : *or the nasal organs may be inconspicuous, and the back compressed into a keel* (*Anosmius*, Peters). *Dorsal and anal fins with few rays. Body wholly or partially covered with fine dermal spines, or such may be absent. There may be a more or less distinct fold along the lower part of the tail, and very apparent nasal organs* (*Gastrophysus*, Müll.) : *or should the fold be absent, but the body be spinate and the nasal organs very distinct* (*Cheilichthys*, Müll.) : *or the fold be absent and the skin smooth* (*Liosaccus*, Günther). *A portion of the œsophagus dilatable and able to be distended with air. Air-vessel present and horse-shoe shaped.*

The *Tetrodons* are termed *Kuddul mah-cutchee*, or "Sea Frogs" by the natives of Malabar, on account of the noise they make when captured : although they are occasionally eaten by the lower classes, they are said to occasion indigestion, so are usually avoided, while all of them emit an odour the reverse of agreeable. The native doctors sometimes prescribe them in cases of lung affections. The Burmese in some districts consider these fishes to be poisonous, but in other localities they eat them, being very careful to first remove the gall-bladder, which they assert occasions all the poisonous symptoms. The Japanese eat one species as a means of enabling them to commit suicide. The Andamanese eat these fishes, as I personally witnessed : they appeared rather to prefer them to some of the better kinds. Hamilton Buchanan observed the fishes of this genus are eaten by the poor, but are considered as indifferent food. Bleeker remarked on their poisonous qualities at Batavia, where some species are prohibited from being sold : he enumerates *T. oblongus* and *T. reticularis* as very venomous, *T. stellatus* as venomous, but says that *T. lunaris* is eaten. Cantor likewise

* *Kappa*, Tel. : *Plachee*, Tam. *Globe or puff fishes.*

remarked that due to their poisonous nature they are even objected to as manure in Malayan countries. In Egypt exists a poisonous *Tetrodon*, whilst at the Cape of Good Hope eating a spotted *Tetrodon* has caused so many deaths amongt the sailors in harbour, that they are specially warned against employing them as food.

The colours of these fishes are subject to considerable variation: thus (as in *T. stellatus*), abdominal bands may be seen in the young (*T. lineatus*), but absent or only slightly marked in the adult: but the young also may be destitute of these bands. Spots may be present or absent, as in a variety of *T. nigropunctatus* there are no spots.

The extent of the spines may vary in the same species of the fish, thus in *T. nigropunctatus* some examples may be almost entirely covered with well marked spines, or such may almost be concealed in the skin, or even be nearly absent.

Geographical distribution.—Tropical and sub-tropical seas entering estuaries, whilst some few are found in fresh waters.

SYNOPSIS OF INDIAN SPECIES.

A.—*Back broad: nasal organs conspicuous.*

a.—Two nasal openings on either side, situated in a single and prominent papilla (*Tetraodon*, Bleeker).

1. *A fold of skin along the lower part of the side of the tail* (*Gastrophysus*, Müller).

1. *Tetrodon inermis.* Very soft spines on the abdominal surface only, and not extending to vent. A dull band from eye to tail, above this plumbaceous, below silvery white. Seas of India to Japan.

2. *Tetrodon lunaris.* Spines along the back to the dorsal fin, and along the abdomen. Silvery.

3. *Tetrodon sceleratus.* Spines along the back to the dorsal fin, also along the abdomen. Greenish superiorly, with brown spots: a triangular white spot before the eye. Red Sea to the Malay Archipelgo, and beyond.

4. *Tetrodon hypselogenion.* Spines of moderate size, rather wide asunder, going from eye to dorsal fin, along abdominal surface to vent, and also behind pectoral fin. Yellowish brown, with light or white spots on the back, and white on the sides and below: from 3 to 5 vertical bands below the eye: caudal barred. Red Sea to Australia.

5. *Tetrodon oblongus.* Two-rooted spines from nostrils to dorsal fin: a few on cheeks, and numerous on abdomen as far as vent. Brown bands from back down the white sides: round or oval white spots on head and back. Seas of India to China, and beyond.

b.—A fringed but single, unperforated, nasal cavity with a fringed edge: body spiny.

6. *Tetrodon patoca.* Three or 4-rooted spines from nostril to dorsal fin, inferiorly to the vent. Brown superiorly with many round or oval white spots. Seas of India to China.

c.—A simple and circular nasal cavity: body spineless (*Monotretus*, Bibron).

7. *Tetrodon cutcutia.* A light interorbital band: a black ocellus on the side anterior to the dorsal fin: reticulated all over: caudal fin tipped with carmine. Fresh waters of Orissa, Bengal and Assam.

d.—Two solid tentacles, one on each side of an impervious nasal fossa (*Arothron*, Müller).

8. *Tetrodon immaculatus.* Small spines cover the body, except snout and posterior half of the tail: interorbital space broad Without spots or lines: or with parallel lines on the body, or spots on the head. Red Sea to the Malay Archipelago, and beyond.

9. *Tetrodon nigropunctatus.* Spines small, usually covering the entire body; interorbital space narrow. Brownish, more or less covered with black spots: vent in a black spot. Red Sea to the Malay Archipelago, and beyond.

10. *Tetrodon stellatus.* Spines small, covering the body. Brownish, with dark spots placed closely together on the back and upper portion of the sides: vent in a black spot: the young with black semi-circular abdominal bands. Red Sea to the Malay Archipelago, and beyond.

11. *Tetrodon reticularis.* Spines small, covering the body. Body superiorly gray or brown, becoming white below: with concave black bands which are continued round the eye: white spots on back: caudal reticulated with black. Seas of India to the Malay Archipelago and New Guinea.

12. *Tetrodon hispidus.* Spines small, those on abdomen with 2 or 3 roots, they cover the body to the base of the caudal fin. Brown along the back with bluish-white spots, and one or two light bands round the orbit and also round the base of the pectoral fin. Sometimes lines or spots of black on the abdomen, but not ascending on to the cheeks. Red Sea to the Malay Archipelago, and beyond.

13. *Tetrodon leopardus.* Two-rooted and widely separated spines from eye to dorsal fin, also along the abdominal surface to the vent: dark along the back with round white spots: a light interorbital band: reticulated black lines enclosing spaces on the dorsal and caudal fins. Seas of India.

14. *Tetrodon viridipunctatus.* Two-rooted and widely separated spines from eyes nearly to dorsal fin, and inferiorly as far as anus. Back dark green, with emerald green spots: a light interorbital band with a central

prolongation backwards: a second transverse band over the back: four black spots under throat: caudal and anal dark edged. Cochin.

15. *Tetrodon fluviatilis.* Two-rooted and widely separated spines from eye to the base of the dorsal fin, and along the abdomen as far as the vent. Greenish olive superiorly, becoming light on the sides and below. Large black blotches along the sides, and two or more light bands cross between the eyes and over the back. Seas and estuaries of India to the Malay Archipelago, and beyond.

c.—Nasal organs inconspicuous: back compressed into a keel (*Anosmius*, Peters).

16. *Tetrodon margaritatus.* Spines minute, but usually cover the body. Dull reddish, becoming lighter beneath. Blue bands and spots on the head, and blue spots on the body: caudal fin with or without similar spots. Red Sea to the Malay Archipelago, and beyond.

A.—*Back broad: nasal organs conspicuous.*

a. Two nasal openings on either side, situated in a single and prominent papilla: a fold of skin along the lower part of the side of the tail (Gastrophysus).

1. Tetrodon inermis, Plate CLXXX, fig. 1.

Tetraodon inermis, Temm. and Schleg. Fauna Japon. p. 278, t. cxxii, f. 2.

B. v, D. 12-13, P. 19, A. 11, C. 10.

Length of head equals its distance from the base of the dorsal fin. *Eyes*—rather large and situated nearer the gill-opening than the end of the snout. Interorbital space broad, equalling $1\frac{1}{3}$ diameters of the eye. *Teeth*—in the two jaws of about the same size. *Fins*—dorsal with its anterior rays the longest, situated in the last third of the distance between the nostrils and base of the caudal fin, its height is rather above twice the length of its base: anal of similar size and shape. Caudal emarginate. *Spines*—if they can be so termed, are soft and widely separated, they only exist along the abdominal surface, not extending so far as the vent. A moderately well marked fold of skin along the side of the tail. Skin on the summit of the head with short longitudinal rugæ. *Colours*—Upper surface of head and back plumbaceous: a broad dull brown band passes from the eye nearly to the tail, beneath which it is silvery white. Gill-opening black internally: dorsal fin dark in its upper 2/3: caudal dark in its last half, margined with white.

Habitat.—Seas of India to Japan. The example figured was from Madras, where it attains at least 17·5 inches in length.

2. Tetrodon lunaris, Plate CLXXXII, fig. 2.

Tetrodon lunaris, Bl. Schn. p. 505; Temm. and Schleg. Faun. Japon. Poiss. p. 277, pl. 122, fig. 1; Rüpp. N.W. Fisch. p. 59; Cant. Mal. Fish. p. 378; Bleek. Beng. p. 78, and Atl. Ichth. v, p. 63, pl. ccv, fig. 2; Jerdon, M. J. L. and Sc. 1851, p. 150; Day, Fish. Malabar, p. 255; Russell, Fish. Vizag. i, p. 20, pl. xxix; Günther, Catal. viii, p. 274; Klunz. Fische Roth. Meer. 1871, p. 639.

Tetrodon tepa, Ham. Buch. Fish. Ganges, pp. 10, 302.

Tetrodon leiopleura, Gray and Hardw. Ill. Ind. Zool.

Physogaster lunaris, Mull. Abhandl. Ak. Wiss. Berl. 1839, p. 252.

Gastrophysus lunaris, Mull. Wiegm. Arch. ix, p. 330; Blyth, J. A. S. of Beng. 1860, p. 173.

Promecocephalus lunaris (Bibr.), Duméril, Rev. Zool. 1855, p. 279.

Tetrodon spadiceus, Richards. Voy. Sulph. Ichth. p. 123, pl. 58, figs. 4 and 5; Bleek. Atl. Ichth. v, p. 64, pl. ccvii, fig. 1.

Kappa koorawah, Tel.: *Cha-mo-dah*, Andamanese.

B. v. D. 12-14, P. 16-19, A. 11-12, C. 10.

Length of the head equal to or rather less than the distance between it and the base of the dorsal fin. *Eyes*—rather large, and situated much nearer gill-opening than to the end of the snout: interorbital space flat and equal to $1\frac{1}{2}$ diameters of the eye. *Teeth*—in jaws of about the same size. *Fins*—dorsal with its anterior rays the longest, situated in the last third of the distance between the front edge or middle of the eye and the base of the caudal fin: anal similar to dorsal. Caudal emarginate. *Spines*—small, entirely covering the back, or only anteriorly from opposite the front margin of the eyes: abdomen similarly protected: snout, sides and tail spineless. *Colours*—Greenish-olive above, sides and abdomen of a white satin, having a yellowish line from the eye to the centre of the caudal fin: end of caudal dark with a light outer edge.

Habitat.—Red Sea, seas of India to the Malay Archipelago, and beyond: attaining at least a foot in length. The example figured was from Madras. The fry are common in the Hooghly.

3. Tetrodon sceleratus.

(Forster) Gmel. Linn. i, p. 1444; Bl. Schn. p. 506; Lacép. i, pp. 476, 508; Günther, Catal. viii, p. 726; Klunz. Fish. Roth. Meer. 1871, p. 640.

Tetrodon argenteus, Lacép. Ann. Mus. d'Hist. Nat. iv, 1804, p. 211, t. lviii. f. 2; Temm. and Schleg. Fauna Japon. Poiss. p. 275, t. cxxi. f. 2; Bleeker, Beng. p. 78; Banka, p. 737, and Atl. Ich. v, p. 64, t. ccix, f. 1.

Tetraodon argyropleura, Bennett, Pro. Zool. Soc. ii, 1832, p. 184.
Gastrophysus argenteus (J. Müll.) Bleeker, En. Pisc. p. 199.
Tetraodon argentatus, Blyth, in Kelaarts, Prod. Faun. Zeyl. i, Appendix, p. 49.
Promecocephalus argentatus (Bibron), Duméril, Rev. Zool. 1855, p. 279.
Tetraodon bicolor, Brevoort, Not. Japan. Fish. p. 283.

B. v, D. 10-12, P. 16-17, A. 9-11, C. 11.

Length of head equals about 2/3 of its distance from the base of the dorsal fin. *Eyes*—nearly two diameters from the end of snout. Tail depressed. *Fins*—dorsal situated in the anterior third of the total length excluding the caudal fin, the latter, which is emarginate, being 1/6 to 1/7 of its total length. *Spines*—head and back with fine spines, none on the sides, but some with three roots present along the abdominal surface to a short distance behind the base of the anal fin. *Colours*—olive-green superiorly with some brown spots: whitish laterally and below, with a silvery longitudinal band: a triangular white spot in front of the eye: a brown band round the mandibles, and which is sometimes continued along the side below the silvery lateral band: gill-openings black.

Habitat.—Red Sea, East coast of Africa, seas of India to the Malay Archipelago, and beyond: attaining at least 2½ feet in length.

4. Tetrodon hypselogenion, Plate CLXXXIII, fig. 5.

Tetraodon honckenii, Rüppell, Atl. Fische, p. 65, t. xvii, f. 2 (not Bloch).
Tetraodon pœcilonotus (? Temm. and Schleg. Fauna Japon. p. 279, t. cxxiv, f. 2): Klunz. Fische Roth. Meer. 1871, p. 637.
Tetraodon hypselogenion, Bleeker, Moluk. p. 300, Blootk. p. 24, and Atl. Ich. v, p. 61, t. ccxiii, fig. 5; Günther, Catal. viii, p. 277.
Arothron hypselogenion, Bleeker, En. Pisc. p. 200.
Dilobomycterus Rupellii (Bibron), Duméril, Rev. Zool. 1855, p. 275.

B. v. D. 8-9, P. 16, A. 8, C. 10.

Length of head equals its distance from the base of the dorsal fin. *Eyes*—situated rather behind the middle of the length of the head. The osseous interorbital space very much narrower than the shortest diameter of the eye. *Teeth*—of about the same size in both jaws. *Fins*—dorsal situated in the hind third of the distance between the front edge of the eye and the base of the caudal fin, the length of its base is only 2/5 of its height, its anterior rays the highest: anal of similar form. Caudal slightly emarginate, the outer rays being the longest, its height being 4½ in that of the total. *Spines*—of moderate size and rather widely separated, they commence on the dorsal profile from a slight distance posterior to the eyes and are continued half the distance or even more to the base of the dorsal fin: they are also continued along the abdominal surface almost to the vent: some are likewise present on the sides behind the pectoral fin. *Colours*—of a yellowish-brown, becoming white stained with yellow beneath: the colour of the back being often sharply defined from the white of the sides: the whole of the upper surface covered with light dots, which have usually dark edges: from three to five vertical bars under the eye. Caudal with about seven vertical bands most distinct in its upper lobe.

Habitat.—Red Sea, and East coast of Africa to the Malay Archipelago, and Australia. It attains about six inches in length. The example figure was from Madras, where it is common.

5. Tetrodon oblongus, Plate CLXXXII, fig. 3.

Tetraodon oblongus, Bl. tab. cxlvi, fig. 1; Bonn. Ency. Ich. p. 25; Gmel. Linn. p. 1446; Lacép. i, pp. 476, 502; Bl. Schn. p. 504; Cant. Mal. Fish. p. 380; Bleeker, Blootk. p. 12, and Atl. Ichth. v, p. 62, pl. ccviii, figure 4; Günther, Catal. viii, p. 278.
Tetraodon, Russell, Fish. Vizag. i, p. 17, and *Kappa*, pl. xxiv.
Physogaster oblongus, Müller, Abhandl. Ac. Wiss. Berl. 1839, p. 252.
Tetraodon alboplumbeus, Richards. Voy. Sulph. Ichthyol. p. 121, pl. lviii, figs. 6 and 7 and Ichth. China, p. 199; Bleek. l. c. p. 62, pl. ccv, fig. 1.
Tetraodon patoca, Bleeker, Blootk. p. 11 (not H. B.).
Amblyrhyncotus oblongus (Bibron), Duméril, Rev. Zool. 1855, p. 280.
Gastrophysus alboplumbeus, Bleek. Nat. Tyds. Ned. Ind. vii, p. 104.
Tetraodon niveatus, Brevoort, Notes on Japan. Fish. p. 284.
Tetraodon Hartlaubii, Bianconi, Mem. Accad. Bologn. vi, p. 146, pl. ii, fig. 1.
Gastrophysus microphthalmus, Blyth, Journ. As. Soc. Beng. xxix, 1860, p. 174.

D. 12, P. 17, A. 10, C. 10.

Length of the head equals its distance from the base of the dorsal fin. *Eyes*—in or a little before the middle of the length of the head, and small in adults: the interorbital space nearly flat and very broad in adults, in which it exceeds the length of the snout. *Teeth*—the lower a little larger than the upper pair. *Fins*—dorsal with its central ray somewhat the highest, it is situated in the last third of the distance between the front edge of the eye and the base of the caudal fin, its height equals about twice the length of its base: anal beneath the dorsal and of similar shape and size. Caudal truncated. *Spines*—with two roots and present on the back from

the nostrils to the dorsal fin: a few on the lower part of the cheeks and numerous along the abdominal surface almost as far as the vent. *Colours*—of a light brownish along the back, becoming white tinged with yellow on the sides and beneath. Bands of dark brown pass from the back down the sides to the middle of the body enclosing light spaces of irregular sizes and shapes or round spots. From the snout to the dorsal fin round or oval light spots predominate. Occasionally a few bars descend from the eye over the cheek. Fins yellow stained with orange, sometimes a black shoulder spot.

Habitat.—Seas of India to the Malay Archipelago, China, Japan, and the South Sea. The example figured was from Madras.

b. A fringed but single unperforated nasal cavity, with a fringed edge: body spined (*Chelonodon*, Müller).

6. Tetrodon patoca, Plate CLXXXII, fig. 4.

Tetraodon, Russell, Fish. Vizag. i. p. 18, and *Kappa*, pl. xxv.

Tetrodon patoca, Ham. Buch. Fish. Ganges, pp. 7, 363, pl. xviii, f. 2; (Bibron), Duméril, Rev. Zool. 1855, p. 280; Günther, Catal. viii, p. 288.

Tetrodon maculatus, Swainson, Fishes, ii, p. 328.

Tetrodon dissutidens, Cantor, Catal. Malay. Fish. p. 382; Jerdon, M. J. L. and Sc. 1851, p. 150.

Tetrodon kappa, Bleeker, Beng. pp. 78, 160, Blootk. p. 16, and Moluk. p. 301.

Chelichthys dissutidens, Rüpp. Verz. Senck. Mus. Fisch. p. 35.

Arothron ? kappa, Bleeker, En. Pisc. p. 200.

Chelonodon kappa, Bleeker, Ceram. p. 183.

Leiodon patoca, Bleeker, Atl. Ich. v, p. 76, t. ccx, f. 2.

D. 10-11, P. 18, A. 8-10, C. 10-11.

Length of head is rather less than its distance from the base of the dorsal fin. *Eyes*—situated in about the middle of the length of the head, interorbital space broad. *Teeth*—of about the same size in either jaw. *Fins*—dorsal and anal rounded, the caudal (which is from $4\frac{1}{2}$ to $5\frac{1}{2}$ in the total length) truncate. Height of dorsal fin equals the length of the head excluding the snout. *Spines*—small, with three or four roots, extending from a short distance behind the nostrils to the base of the dorsal fin: inferiorly they extend over the chest nearly as high as the base of the pectoral fin and posteriorly to the vent. *Colours*—upper half brown or black with numerous round or oval white spots, sides and abdomen silvery, a yellowish tinge dividing the dark back from the white side. Caudal in the young stained dark in its outer half. The caudal fin is rather longer, the back is darker, the light spots smaller and more distinct in examples from Calcutta than in those from the sea. In some, especially marine forms and immature specimens, two to three distinct dark bands descend from the back to the middle of the sides, and a fourth passes across the head.

Habitat.—From Sind through the seas of India to China, attaining at least 13 inches in length. It is very common along the Coromandel coast of India.

c. A simple and circular nasal cavity: body spineless (*Monotretus*, Bibron).

7. Tetrodon cutcutia, Plate CLXXXII, fig. 5.

Hamilton Buchanan, Fish. Ganges, pp. 8, 362, pl. xviii, f. 3; Bleeker, Beng. pp. 78, 160; Günther, Catal. viii, p. 290.

Tetrodon caria and *gularis*, Ham. Buch. l. c. pp. 9, 10.

Leisomus marmoratus, Swainson, Fishes, ii, p. 328.

Monotretus cutcutia (Bibron), Duméril, Rev. Zool. 1855, p. 281.

Leisomus cutcutia, Blyth, Journ. As. Soc. of Bengal, 1860, p. 173.

B. v, D. 10-11, P. 21, A. 10, C. 7.

Length of head equals its distance from the base of the dorsal fin, caudal fin 6 in the total length. *Eyes*—slightly behind the middle of length of head: interorbital space flat and broad. Nostril a single orifice, situated in a very short simple tube. *Fins*—dorsal situated in the posterior 1/3 of the distance between the front edge of the eye and the base of the caudal fin: all the fins rounded. *Spines*—entirely absent. *Colours*—greenish yellow above, becoming white on the abdomen. A light band passes from eye to eye. A large black ocellus, surrounded by a light edge, on the side anterior the origin of the dorsal and anal fins. The whole of the back marked with dark greenish reticulations enclosing lighter spaces: fins grayish: caudal tipped with carmine: a red spot on the throat.

Habitat.—Fresh waters of Orissa, Bengal and Assam. It attains about $3\frac{1}{2}$ inches in length. The example figured was from Orissa.

d.—Two solid nasal tentacles, one on each side of an impervious nasal fossa (*Arothron*, Müller).

8. Tetrodon immaculatus, Plate CLXXXIII, fig. 4.

A.—*Variety without spots or lines.*

Tétrodon sans tache, Lacép. i, pp. 475, 486, t. xxiv, f. 1.

Tetrodon immaculatus, Bl. Schn. p. 507; Cuv. Règn. Anim.; Cantor, Malay. Fish. p. 373; Bleeker, Beng. p. 78; Jerdon, M. J. L. and Sc. 1851, p. 150; Günther, Catal. viii, p. 291; Klunz. Fische Roth. Meer. 1871, p. 642.

Tetraodon, Russell, Fish. Vizag. i, p. 19, and *Kappa*, pl. xxvi.

Tetraodon sordidus, Rüpp. Atl. Fische, p. 64, and N. W. Fische, p. 60, t. xvi, f. 4.

Arothron sordidus, Rüpp. Verz. Senck. Mus. Fische, p. 35.

Tetraodon parvus, De Joannis, Mag. Zool. 1835, iv, pl. xv.

Tetraodon scaber, Eyd. and Soul. Voy. Bonite, Poiss. p. 214, pl. x, f. 1.

Tetrodon aspilos, Bleeker, Beng. p. 78, Riouw, p. 495, and Blootk. p. 23,

Tetrodon kunhardti, Bleeker, Tetraod. p. 97, and Blootk. p. 23.

Dilobomycterus immaculatus (Bibron), Duméril, Rev. Zool. 1855, p. 279.

Arothron scaber and *immaculatus*, Bleeker, Halmah. p. 112, and En. Pisc. pp. 201, 202.

Crayracion immaculatus, Bleeker, Atl. Ich. v, p. 75, t. ccxi, f. 1.

B.—*Variety with parallel lines on the body or spot on the head.*

Tetrodon Manillensis, Procé, Bull. Philom. 1822, p. 130.

Tetrodon virgatus, Richards. Voy. Ereb. and Terror, Fish. p. 62, pl. xxxix, f. 8, 9, and Voy. Herald, Zool. p. 163, pl. xxviii, f. 6-8; Bleeker, Blootk. p. 24, and Moluk. p. 299.

Holocanthus pilosus, Gronov. ed. Gray, p. 28.

Dilobomycterus longicaudus, Bibron, Rev. Zool. 1855, p. 279.

Arothron virgatus, Bleeker. En. Pisc. p. 202.

Crayracion Manillensis, Bleeker, Atl. Ich. v, p. 69, t. ccviii, f. 2.

Crayracion Cochinensis, Day, Proc. Zool. Soc. 1865, p. 314, and Fish. Malabar, p. 258. pl. xx, f. 2 (*a white spot over eye*).

D. 9-10, P. 17-18, A. 8-10, C. 9-10.

Length of head equals its distance from the base of the dorsal fin. *Eyes*—situated in about the middle of the length of the head, the interorbital space broad and flat. *Teeth*—of about equal size in both jaws. *Fins*—rounded, the dorsal is situated in the last third of the total length excluding the caudal fin, its height equals about 1/2 the length of the head. Caudal rather elongated, being equal to 1/4 of the total length. *Spines*—small, covering the body except the snout and the posterior half of the tail. *Colours*—greenish superiorly: brownish along the middle of the side, and dirty white below: upper and lower edges as well as the end of the caudal black. In some there is a white spot over the eye: occasionally there are several parallel grayish longitudinal bands on the sides. In some examples all the spines are white.

Habitat.—From the Red Sea, through the seas of India to the Malay Archipelago, and beyond: attaining at least 12 inches in length.

9. Tetrodon nigropunctatus, Plate CLXXX, fig. 4.

Bl. Schn. p. 507; Günther, Catal. viii, p. 293; Klunz. Fische Roth. Meer. 1871, p. 643.

Tetraodon trichoderma, Bleeker, Sumatra, p. 532.

Tetraodon trichodermatoides, Bleeker, Flores, p. 336.

Arothron trichoderma and *trichodermatoides*, Bleeker, En. Pisc. pp. 201, 202.

Arothron melanorhynchus, Bleeker, Halmah. p. 111, and En. Pisc. p. 201.

Crayracion nigropunctatus, Bleeker, Atl. Ich. v, p. 74, t. ccvi, f. 4.

B. v, D. 10, P. 18, A. 9, C. 9.

Length of head nearly equals its distance from the base of the dorsal fin. *Eyes*—rather small, about two diameters from the end of the snout and about three apart: interorbital space nearly flat, and the osseous portion less than two diameters of the eye wide. *Teeth*—of about the same size in both jaws. *Fins*—dorsal situated in the last fourth of the body excluding the caudal fin: it and the anal are rounded. Caudal rounded and equal to about 1/5 of the total length. *Spines*—small, and usually cover the entire body, they are either much projecting or almost concealed in the skin: the extent over which they extend also varies, in fact they appear to be absent in some examples. *Colours*—brown above, becoming lighter on the sides and beneath: some scattered black dots over the body, and the vent in a black spot: the snout and round the mouth black or very dark brown: the spots in some examples are absent. In one variety termed *citrinella*, Günther, l. c. the entire body is of a beautiful lemon colour. Besides the scattered spots on the sides, there are some irregular small and large black spots on the back: one large blotch round the base of the dorsal fin, which also is black. A large round black spot round the eye and gill-opening. (Günther, l. c.)

Habitat.—Red Sea, and East coast of Africa, through the seas of India to the Malay Archipelago, and beyond. It attains at least to nine inches in length. The example figured (life-size) was from Madras.

10. Tetrodon stellatus, Plate CLXXXIII, fig. 3.

A.—*Synonymy of old examples without lateral or abdominal bands or large spots.*

Tétrodon étoilé and *moucheté*, Lacép. i, pp. 474, 475, 483, 491, t. xxv, f. 1.
Tetrodon lagocephalus, var. *stellatus*, and *Commersonii*, Bl. Schn. pp. 503, 508.
Tetrodon maculatus, Lefebvre, Voy. Abyss. vi, p. 237, pl. vii.
Tetrodon pantherinus, Eydoux and Soul. Voy. Bonite, Poiss. p. 215, pl. x, fig. 3.
Holocanthus variolosus, Gronov. ed. Gray. p. 26.
Crayracion stellatus, Bleek. Atl. Ichth. v, p. 73, t. ccix, fig. 2.
Tetrodon stellatus, Günther, Catal. viii, p. 294; Klunz. Fische Roth. Meer. 1871, p. 644.

B.—*Synonymy of examples with lateral bands or spots.*

Tétrodon pointillé, Lacép. i, pp. 474, 485.
Tetrodon pseudopterus, Bl. Schn, p. 508.
Tetrodon calamara (Cuvier), Bleeker, Beng. p. 78.
Tetraodon, Russell, Fish. Vizag. i, p. 19, and *Calamarah kappa*, pl. xxviii.
Tetraodon calamara, Rüpp. Atl. Fisch. p. 64, tab. xvii. fig. 1 and N. W. Fische, p. 61; Bleeker, Blootk. p. 15.
Arothron stellatus, Rüpp. Senck. Mus. Fische, p. 35.
Arothron calamara, Bleek. En. Pisc. p. 200.

C.—*Synonymy of examples with abdominal bands.*

Tetrodon lineatus (not Lin.), Bl. tab. cxli; Bonn. Ich. p. 23, t. xvi, f. 51; Bl. Schn. p. 503; Peters, Arch. Ntrg. xxi, p. 274; Schleg. Faun. Japon. Poiss. p. 287, tab. cxxv, f. 2; Swainson, Fishes, ii, p. 328
Tetrodon aerostaticus, Jenyns, Zool. Beagle, Fish. p. 152.
Tetrodon astrotænia, Bleek. Nat. Tyds. Ned. Ind. iv, p. 129.
Arothron lineatus, Bleeker, Japan, p. 40, and Amboina, p. 67.
Crayracion lineatus, Bleek. Atl. Ichth. v, p. 70, pl. ccvi, fig. 1, and pl. ccxii, fig. 1.
Crayracion astrotænia, Bleek. l. c. p. 69, pl. ccxiv, fig. 2.

B. v, D. 11, P. 18-21, A. 11-12, C. 11.

Length of head equals its distance from the base of the dorsal fin. *Eyes*—rather above two diameters from the end of the snout, and $2\frac{1}{2}$ apart: interorbital space nearly flat and the osseous portion extending the whole distance. *Teeth*—of about the same size in both jaws. *Fins*—dorsal situated in the last 1/4 of the distance between the end of the snout and the base of the caudal fin, which is rounded and about 1/6 of the total length. *Spines*—small, extended all over the body, from just behind the lips almost to the base of the caudal fin. *Air-vessel*—horse-shoe shaped. *Colours*—generally of a brownish-yellow tint along the back: the whole of the back and sides as low as the lower level of the pectoral covered with brown spots divided by yellowish-white lines above, but further apart lower down. Caudal spotted: dorsal and anal dark: pectoral yellowish, often with a black base margined by a white line, also a black streak below its base inferior to which are three black blotches: anus in a black ring: lower lip black, yellow at the angle, inside of mouth and tongue black.

In the variety *lineatus* there are concave black bands on the abdomen, which however, are not constant in their direction, often become confluent and are usually lost in adults.

Owing to its reputed poisonous quality it is forbidden to sell this fish at Batavia.

Habitat.—Red Sea, East coast of Africa, seas of India to the Malay Archipelago and beyond, attaining at least two feet in length. The example figured (eight inches long) was from Madras.

11. Tetrodon reticularis, Plate CLXXX, fig. 5.

Tetrodon testudineus (not L), Bl. Ausl. Fisch. t. cxxxix; Lacép. i, p. 477; Bl. Schn. p. 502; Shaw, Zool. v, p. 444, pl. clxxviii; Cuv. Règn. Anim.; Swainson, Fishes, ii, p. 328; Cant. Mal. Fish. p. 376; Bleeker, Blootk. p. 14 and Singap. p. 78.
Tetrodon reticularis. Bl. Schn. p. 506; Günther, Catal. viii, p. 296.
Arothron testudinarius, Mull. Arch. Ntrg. ix, p. 330.
Arothron testudineus, Bleeker, En. Pisc. p. 201.
Crayracion testudineus, Bleek. Atl. Ichth. v, p. 71, pl. ccxii, fig. 3; Day, Fish. Malabar, p. 257.
Puutha, Mal.: *Ko-pud-dah*, Andamanese.

D. 10-11, P. 19, A. 10-11, C. 10-11, Vert. 8/10.

Length of head equals its distance from the base of the dorsal fin. *Eyes*—situated in about the middle of the length of the head, the interorbital space broad and flat. *Teeth*—of about the same size in either jaw.

Fins—rounded, the dorsal situated in the last fourth of its total length excluding the caudal fin, its height somewhat exceeds half the length of the head. Length of caudal fin equal to 4½ in the total length. *Spines*—small, cover the entire body except the forepart of the snout. *Colours*—upper surface of the body deep gray or brown, becoming white below: with from eight to ten longitudinal black stripes, which, under the eye, as well as round the mouth and pectoral fin, are concave: on the back are darker blotches anteriorly (where blackish bands surround spots of white or gray), it is chequered with black posteriorly: caudal reticulated with black on a white ground. In the young the bands on the cheek are wanting.

Bleeker observes that this species is deemed poisonous in the Malay Archipelago.

Habitat.—Seas of India to the Malay Archipelago and New Guinea. It attains at least seventeen inches in length.

12. Tetrodon hispidus, Plate CLXXXIII, fig. 2.

(? Linn. Syst. Nat. i, p. 411; Bloch, t. cxlii; Bl. Schn. p. 504;) Lacépède, i, p. 487, t. xxiv, f. 2; Richardson, Voy. Samarang, Fish. p. 17, pl. ix, fig. 3, 4; Günther, Catal. viii, p. 297; Klunz. Fische Roth. Meer. 1871, p. 641.

Tetraodon perspicillaris, Rüppell, Atl. Fische, p. 63.

Tetraodon semistriatus, Rüpp. N.W. Fische, p. 58, t. xvi, f. 3.

Tetrodon implutus, Jenyns, Voy. Beagle, Fish. p. 152.

Tetrodon bondarus, Cantor, Catal. Mal. Fish. p. 377; Bleeker, Beng. p. 78, and Atl. Ich. v. p. 73; Günther, Catal. viii, p. 298.

Tetrodon stellatus, Eyd. and Soul. Voy. Bonite, Poiss, p. 212, t. x, f. 2 (not Lacépède).

Tetrodon laterna, Richardson, Voy. Sulphur, Zool. p. 124, pl. lxi, f. 2, and Ich. China, p. 199; Bleeker, Blootk. p. 23 and Moluk. p. 299; Günther, Fish. Zanz. p. 131.

Arothron laterna, Bleek. En. Pisc. p. 200.

Crayracion implutus, Bleeker, Atl. Ich. v, p. 71.

Crayracion laterna, Bleeker, Atl. Ich. v, t. ccv, f. 3.

B. v, D. 10, P. 17-18, A. 10-11, C. 11.

Length of head equals its distance from the base of the dorsal fin. *Eyes*—of moderate or rather small size, from 2½ to 3 diameters from the end of snout, and 3 apart: orbit prominent and interorbital space concave, upper profile of snout rather concave. *Fins*—rounded: caudal about 1/5 of the total length. *Spines*—small, those on the abdomen with two or three roots, they cover the body from the snout to a short distance behind the base of the dorsal fin. In some examples they appear not to extend so far, as Jenyns described the *T. implutus* with its "body everywhere smooth except the middle of the abdomen from underneath the pectorals to the vent, and not very prickly here." *Colours*—Brown superiorly, with a moderate number of bluish-white spots: one or two bluish-white bands sometimes exists round the orbit, another well-marked one round the gill-opening and pectoral fin: sometimes there are lines or spots of black on the abdomen, but they do not ascend to the cheeks: some have several black blotches along either side of the abdomen, or bands descending on to it.

Bleeker observes that the superior pharyngeal bone in this species has its summit of moderate size, a little obtuse, and armed with many rows of small teeth, whereas in *T. reticularis* the summit of this bone is obtuse and rounded without visible teeth, but divided by numerous transverse ridges.

Cantor's type of *T. bondarus* (a painted skin), is in the British Museum, and is unquestionably this species, and must have been coloured almost identically to the example figured pl. clxxxii, f. 2.

Habitat.—From the Red Sea through the seas of India to the Malay Archipelago, and beyond. Attaining at least twenty inches in length. The example figured (life size) was from Madras.

13. Tetrodon leopardus, Plate CLXXX, fig. 2.

? *Tetraodon*, Russell, Fish. Vizag. i, p. 19 and *Bondaroo kappa*, pl. xxvii; Jerdon, M. J. L. & Sc., 1851, p. 150.

B. v, D. 11, P. 18, A. 8-9, C. 11.

Length of head equals its distance to the base of the dorsal fin. *Eyes*—of moderate size, 1½ diameters apart and the same distance from the end of the snout: interorbital space flat. *Teeth*—about the same size in both jaws. *Fins*—dorsal highest in front, situated in the last third of the distance between the front edge of the eye and the base of the caudal fin: anal similar to dorsal. Caudal rounded and 4⅔ in the total length. *Spines*—two rooted, widely separated along the back, extending from the front edge of the eyes to the dorsal fin: inferiorly they are closer together and reach to the vent. *Colours*—Olive superiorly, extending two-thirds of the distance down the sides, with an interrupted black network surrounding white spots: three black cross bands, one over the head, with a V-shaped light interorbital band posterior to it: the second, above the pectoral fin: the posterior one from the base of the dorsal. Reticulated narrow black lines enclosing large white spots on the caudal and dorsal fins, the latter having likewise a narrow black basal band.

Russell's description of *T. bondaroo kappa* corresponds in colour to the one here described, but the spines resemble *T. reticularis*. It is open to question whether one species is not merely a variety of the other differing in colour, and also in the extent to which the body is spined.

Habitat.—Seas of India.

14. Tetrodon viridipunctatus, Plate CLXXVI, fig. 5.

Leiodon viridipunctatus, Day, Proc. Zool. Soc. 1865, p. 315, and Fishes of Malabar, p. 258, pl. 20, f. 2.
Tetrodon viridipunctatus, Günther, Catal. viii, p. 289.

B. v, D. 12, P. 18, A. 11, C. 11.

Length of head equals its distance from the base of the dorsal fin: caudal fin 1/5 of the total length. *Eyes*—diameter 1/5 of length of head, rather nearer to gill-opening than to the end of the snout. Nostrils two solid tentacles.* *Fins*—all are rounded. *Spines*—two-rooted, short, some distance asunder, they commence from the occiput, and pass along the back two-thirds of the way to the commencement of the dorsal fin: none on the sides. Inferiorly they begin below the orbit, surround the lower and posterior margin of the pectoral fin, and are continued backwards as far as the anus. *Colours*—back light green: abdomen silvery-white: back and sides covered with emerald green spots: a bar of the same colour passes across the vertex from one eye to the other, and also goes backwards in the median line towards a second irregular band of the same colour, which passes across the back more posteriorly. Eye brown, with a golden rim surrounding the iris. Caudal and anal tipped with black: dorsal yellowish: four black spots under the throat.

Habitat.—Cochin on the Malabar coast.

15. Tetrodon fluviatilis, Plate CLXXXIII, fig. 1.

Tetrodon fluviatilis, Ham. Buch. Fish. Ganges, pp. 6, 362, pl. xxx, fig. 1; Swainson, Fishes ii, p. 328; Bleeker, Beng. p. 78; Günther, Catal. viii, p. 292; Steind. Sitz. Ak. Wein. 1870, lxi, p. 640, t. v, f. 2.
Tetrodon nigroviridis, Procé, Bull. Philom. 1822, p. 130.
Tetrodon simulans, Cantor, Catal. Fish. p. 374.
Tetraodon potamophilus, Bleek. Madura, p. 16, and Blootk. p. 17.
Arothron potamophilus and *simulans*, Bleeker, En. Pisc. pp. 201, 202.
Dichotomycterus fluviatilis (Bibron), Duméril, Rev. Zool. 2nd Série, 1855, p. 279.
Arothron dorsovittatus and *simulans*, Blyth, Journ. As. Soc. Beng. xxix, 1860, p. 173.
Crayracion fluviatilis, Bleek. Atl. Ichth. v. p. 68, pl. ccx, fig. 4; Day, Fish. Malabar, p. 256; Steind. Sitz. Ak. Wiss. 1870, p. 18, t. v, f. 2, 2a (var. *ocellata*).

B. v, D. 14-16, P. 22, A. 12-13, C. 11.

Length of head equals its distance from the base of the dorsal fin. *Eyes*—rather large, and from 1½ to 2 diameters from end of snout: the interorbital space broad and slightly convex. *Teeth*—of about the same size in both jaws. *Fins*—dorsal situated in the last third of the distance between the eye and base of caudal fin. Caudal fin truncated, its length being 1/4 of the total. *Spines*—with two roots, widely separated, concealed in the skin, and extending from the hind edge of the eyes to the base of the dorsal fin, also over checks and abdomen as far as the vent. *Colours*—greenish-olive superiorly, becoming white along the sides and below: back and sides with large black blotches, leaving very little of the ground colour apparent: one or two irregular light bands, one crossing between the eyes, another between the pectorals, and often one or two more over the back: abdomen covered with round or angular black spots and blotches much wider than the ground colour, sometimes it is quite black beneath: fins yellowish, end of caudal stained dark and sometimes with black spots.

According to Bleeker, examples from the Malay Archipelago, have fewer rays than those from India, he gives D. 12-14, A. 11-12.

Habitat.—Seas and estuaries of India to the Malay Archipelago, and beyond. It attains at least 6½ inches in length.

e. *Nasal organs inconspicuous: back compressed into a keel* (*Anosmius*, Peters).

16. Tetrodon margaritatus.

? *Tetrodon electricus*, Gmel. Linn. i, p. 1445; Bl. Schn. p. 507.
Tetraodon margaritatus, Rüpp. Atl. Fische, p. 66; Bleeker, Moluk. p. 302, and Blootk. p. 25; Günther, Catal. viii, p. 300 (pt.); Klunz. Fische Roth. Meer. 1871, p. 646.
Tetrodon Solandri, Richards. Voy. Sulphur, Fish. p. 125, pl. lvii, f. 4-6, and Voy. Samarang, Fish. p. 19.
Tetrodon insignitus, Richards. Voy. Samarang, Fish. p. 20, pl. ix, f. 1, 2.
Tetrodon ocellatus, Bennett, Fish. Ceylon, p. 21, pl. xxi (not Bl.).
Tetrodon Petersii, Bianconi, Mem. Acad. Sc. Inst. Bonon. vi, 1855, p. 147, t. ii, f. 2.
Tetrodon ocellatus, Peters, Wiegm. Arch. 1855, p. 274, and Monats. Ak. Wiss. Berl. 1855, p. 462.
Tetraodon papua, Bleeker, Sumbaw. p. 638, and Blootk. p. 13; Günther, Catal. viii, p. 301.
Anosmius ocellatus, Peters, Fische Mossam. i, p. 274.

* The single example being stuffed, the nostrils had become dried, and the figure and description formerly given are erroneous as regards this character, as I have ascertained after macerating the specimen some weeks in spirit.

Rhynchotus margaritatus (Bibron) Duméril. Rev. Zool. 1855, p. 282.
Tropidichthys margaritatus and *Bennetti*, Bleeker, Amboina, pp. 500, 504.
Anosmius Bennetti and *margaritatus*, Bleeker, en. Pisc. pp. 202, 203.
Psilonotus Bennetti, Bleeker, Ternate, p. 230, and Sumatra, p. 66.
Canthogaster ocellatus and *margaritatus*, Bleeker, Atl. Ich. v, pp. 80, 81.
Psilonotus ocellatus and *margaritatus*, Bleeker, Atl. Ich. v, t. ccxiv, f. 4, and t. ccxiii, f. 5.

B. v, D. 9-10, P. 14-16, A. 9, C. 11.

Length of head equal to its distance from the base of the dorsal fin. *Eyes*—rather high up and in the posterior half of the length of the head. Upper profile of snout rather concave. *Fins*—dorsal situated in almost the last fourth of the total length excluding the caudal fin, which last is rather convex and from $4\frac{1}{2}$ to 5 in the total length. *Spines*—minute, and generally covering the entire body, but occasionally deficient from the caudal portion. *Colours*—of a dull reddish, becoming light beneath, fins yellow. The body is variously marked: in *T. margaritatus*, there is a black blue-edged ocellus on either side of the dorsal fin: horizontal blue lines round the eye and on the posterior portion of the body, elsewhere there are small yellow dark-edged ocelli, which are even on the caudal fin. In *T. papua* the black dorsal spot is also present: the oblique bands on the snout become nearly horizontal and a blue band passes to the vent: also angular bands on the tail: body and cheeks covered with small blue, black-edged spots. In *T. Bennetti*, a black dorsal spot also exists. Bluish vertical bands on snout and one along the middle of the throat: angular bands on the tail. Bluish spots on the body, smallest on the sides of the head.

A very good figure of this species exists amongst Sir W. Elliot's drawings of Madras fish, which is referred to by Jerdon as "*Karoom palasi*, Tamil. Not common at Madras." (M. J. L. and Sc. 1851, p. 150.)

Habitat.—Red Sea, East coast of Africa, seas of India to the Malay Archipelago, and beyond.

B.—*Jaws without any median suture.*

Genus—DIODON (*Linnæus*), *Cuvier.*

Paradiodon, Bleeker.

Body nearly globular. Jaws without median suture. Nasal tentacle simple, with a pair of lateral openings. Body covered with stiff and erectile dermal spines, each having a pair of lateral roots. A portion of the œsophagus dilatable, and can be distended with air. No pelvic bones. Air-vessel present.

Geographical Distribution.—Tropical Seas to the Cape of Good Hope.

In the Museum at Calcutta were two examples, but without labels, of the *Diodon spinosissimus*; and as the British Museum contains a specimen from Siam, it is not unlikely that it is found in the seas of India. The *D. novemmaculatus*, Bleeker, is also probably a visitor to India.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Diodon hystrix.* Body covered with short spines, longest on the sides and behind the pectoral fins. Numerous blue or brown round spots. Tropical seas.

1. Diodon hystrix, Plate CLXXIX, fig. 4.

Hystrix piscis, Clusius, Exot. vi, c. 23; Jonston, Nat. Hist. Pisc. t. xlv, f. 4; Willugh. Hist. Pisc. t. i, f. 5.
Reversus Indicus, Aldrov. Pisc. iii, p. 113, t. xv, f. 12; Jonston, l. c. t. iii, f. 1.
Diodon hystrix, Linn. Syst. Nat. i, p. 413; Bris. Barnev. Rev. Zool. 1846, p. 141, Bloch, t. cxxvi; Jerdon. M. J. Lit. and Soc. 1851, p. 150; Günther, Catal. viii, p. 306; Klunz. Fische Roth. Meer. 1871, p. 647.
Diodon atringa, Bloch, t. cxxv; Bl. Schn. p. 511; Lacép. i. t. xxv, f. 3 and ii, pp. 1, 3; Rüpp. Senck. Mus. Fische, p. 35: Kaup, Wiegm. Arch. 1855, p. 227 (not Linn.); Bleeker, En. Pisc. p. 203.
Diodon plumieri, Lacép. i, t. iii, f. 3 and ii, pp. 1, 10.
Diodon brachiatus, Bl. Schn. p. 513.
Diodon punctatus, Cuvier, Mem. Mus. Hist. Nat. iv, p. 132; Bleeker, Blootk. p. 19.
Holocanthus hystrix, Gronov. ed. Gray, p. 27.
Paradiodon hystrix, Bleeker, Atl. Ich. v, p. 56, t. ccvii, f. 2.
Moollu pluchay, Tamil.

Body covered with coarse spines, which are longest on the sides of the body behind the pectoral fin, where they become about 3/4 the length of that fin: they are dilated at their bases and usually with a pair of basal grooves. Two or three pairs of immovable spines at the upper and lower sides of the tail. *Colours*—the whole of the fish (except the ventral surface) of a light brown covered with round blue or brown spots, rarely above one to the base of a single spine. The fins similarly spotted.

Habitat.—From the Red Sea through the seas of India to the Malay Archipelago and the Pacific. The example figured (11 inches in length) was brought from the Andamans by J. Wood-Mason, Esq., of the Calcutta Museum. This fish attains a large size: one in the British Museum is $2\frac{1}{3}$ feet in length.

Sub-class, II—CHONDROPTERYGII.

Elasmobranchii, Buonaparte.

Skeleton cartilaginous: no cranial sutures. From one to seven gill-openings: the gills are attached by their outer edges to the skin, and there usually exists an intervening gill-opening with an external orifice between each: none or only a rudimentary gill cover. Three series of valves at the bulbus arteriosus. Optic nerves, although united, do not decussate. Body with vertical and paired fins, the posterior pair abdominal: caudal with an elongated upper lobe. Intestines with a spiral valve. Male sex with prehensile organs attached to the vertical fins. Ovaries containing large ova, which are fertilised, and sometimes likewise developed internally. Embryo with external deciduous gills. No air-vessel.

This sub-class as at present constituted * is divided into two orders, the first of which does not appear to have representatives in India.

I. Holocephala. With only one external gill-opening and a rudimentary cartilaginous gill-cover: four branchial clefts inside gill-cavity. The palatal and maxillary apparatus coalescent with the skull.

II. Plagiostomata. With five to seven external gill-openings, and no cartilaginous gill-cover. Jaws distinct from the skull.

Order—PLAGIOSTOMATA.

Body more or less cylindrical or depressed: the trunk may or may not pass into the tail. From five to seven gill-openings, which may be lateral or inferior. Jaws distinct from the skull.

This order has been sub-divided as follows:—

Sub-order I—Selachoidei or Sharks. Trunk gradually passing into the tail. Gill-openings lateral.
Sub-order II—Batoidei or Skates and Rays. Gill-openings ventral, p. 727.

Sub-order, I—SELACHOIDEI.

Body more or less cylindrical, gradually merging into the tail. Gill-openings lateral.

Geographical distribution.—Sharks are found in the seas and estuaries of temperate and tropical regions: some ascend rivers even far beyond the influence of the tides. Not only sharks but saw-fishes occasionally reside in fresh-water lakes, when their return to the sea has been cut off. Professor Meyer (Nature, Dec. 30th, 1875), remarks on this subject, "an accurate comparison (between marine and fresh-water forms), showed no difference at all, and therefore the changed conditions seem to have had no influence on the external features of the species."

The sub-order Selachoidei, has been sub-divided into nine families, the following only of which have been recorded from the seas of India.

SYNOPSIS OF FAMILIES.

I. Carchariidæ. A nictitating membrane to eye: two dorsals and an anal fin, p. 710.

II. Lamnidæ. No nictitating membrane to eye: two dorsals and an anal fin: nostrils not confluent with mouth, which last is inferior. Spiracles absent or minute, p. 722.

III. Notidanidæ. No nictitating membrane to eye: only one dorsal fin and an anal, p. 723.

IV. Scylliidæ. No nictitating membrane to eye: two dorsals and an anal fin. Mouth inferior. Teeth small, several rows being generally in use at the same time, p. 724.

* I here omit the consideration as to whether the *Ganoids* and *Dipnoids* should be included with the *Chondropterygii* into one sub-class, Palæichthyes, as proposed. Likewise I have continued to term this sub-class Chondropterygii instead of *Elasmobranchii*, as is now generally adopted by anatomists. I do so because the former designation has the priority.

FAMILY, I—CARCHARIIDÆ.

The snout may be produced longitudinally or laterally. Spiracles absent or present. Eye with a nictitating membrane. A small pit may or may not exist above the root of the tail, and a groove at the angle of the mouth may be present or absent. Mouth crescentic, inferior. Teeth may be erect or oblique, with a single cusp, having smooth or serrated edges: or they may be small, the cusps being obsolete: or with one in the centre and one or two lateral ones. The first dorsal fin, destitute of a spine, is placed opposite the interspace between the pectoral and ventral: anal fin present.

Sharks are found all along the coasts of India, but their carrying off human prey is not a common occurrence. The most savage species appear to be the ground sharks of the rivers, as *Carcharias Gangeticus*, which seldom loses an opportunity of attacking the bather. The *Galeocerdo Rayneri*, is likewise dreaded along the coast or in the harbours. Though stationed several years at Cochin, I could only ascertain a single instance of a living human being having been carried off by these fishes. The most frequent accidents occurring are after the fish has been hooked and lifted into the fisherman's boat: or else while entangled in a net when attempts are made to seize it or cut it adrift. Corpses are almost immediately attacked by sharks.

In some years they are much more numerous than in others, and this is due to the presence or absence of shoals of smaller fish, as sardines (see *Clupea longiceps*, p. 637).

Sharks and rays are captured to a large extent both for the oil which is obtained from their livers, and on account of the flesh of those of medium size, which is salted and sold to the poor.* Their fins likewise are exported to China, where due to the gelatine contained in them, they are in request for making soups, while the skins of some forms are employed as shagreen for scabbards of swords. In most localities they are captured by baits secured to a rough hook, which is attached to a chain: but off the coasts of Sind shark nets of strong twine or string are used, and which are capable of holding these fishes at least up to 20 or 30 feet in length (*see* p. 718).

SYNOPSIS OF GENERA.

First group—CARCHARIINA.

Snout produced longitudinally. Teeth erect or oblique, with a single cusp, which has smooth or serrated edges.

a.—A pit at the base of caudal fin.

1. *Carcharias.* No spiracles, p. 710.
2. *Hemigaleus.* Spiracles minute or small. Teeth serrated or notched in the upper jaw. Distinct labial folds, p. 717.
3. *Galeocerdo.* Spiracles small Teeth serrated in both jaws. Caudal fin with a double notch, p. 718.

Second group—ZYGÆNIINA.

Head produced laterally into the shape of a hammer. Nostrils on front edge of head. Teeth oblique, with a single cusp, having sharp smooth edges.

4. *Zygæna.* Spiracles absent, p. 719.

Third group—MUSTELINA.

Teeth small, having a central and one or two smaller lateral cusps, or such may be obtuse.

5. *Triænodon.* No spiracles. A pit at the root of the caudal fin, p. 720.
6. *Mustelus.* Spiracles small: labial folds well developed. Teeth obtuse. No pit at base of caudal fin, p. 720.

First group—CARCHARIINA.

Snout produced longitudinally. Teeth erect or oblique, with a single cusp, which has smooth or serrated edges.

a.—A pit at the base of caudal fin.

Genus, 1.—CARCHARIAS, *Müller* and *Henle*.

Scoliodon, Aprion or *Aprinodon, Physodon, Hypoprion, Prionodon,* Müller and Henle: *Prionace,* Cantor: *Eulamia, Isogomphodon, Lamiopsis, Platypodon, Hypoprionodon, Isoplagiodon* and *Cynocephalus,* Gill.

* The Seedees (Africans) in Bombay buy small ones as their usual food.

No spiracles. A pit before the root of the caudal fin. Snout longitudinally produced. Mouth crescentic: the labial fold or groove rarely extends beyond the angle of the mouth. Teeth erect or oblique with a sharp more or less compressed cusp, sometimes triangular, the edges of which may be serrated or smooth. The first dorsal fin, destitute of a spine, is placed opposite the interspace between the pectoral and ventral: caudal with a distinct lower lobe.

Respecting the colours in these fishes, it must not be forgotten that black spots or marks on the fins frequently become fainter in examples which have been preserved some time in spirit, more especially if removed from the alcohol and permitted to dry.

The fishes constituting this large and widely distributed Genus have been subdivided by some authors into several genera, by others into the like number of sub-genera or divisions, which latter course is the one I have adopted.

a.—Teeth with smooth edges: all oblique and without swollen bases (*Scoliodon*).

1. *Carcharias laticaudus.* Pectoral fin not reaching to below dorsal: length of base of anal nearly equalling its distance from the ventral: second dorsal posterior to base of anal. Groove at angle of mouth not extending on to the upper jaw. Indian Ocean to the Malay Archipelago, and beyond.

2. *Carcharias acutus.* Pectoral fin reaching to below origin of dorsal: length of base of anal nearly equalling half its distance from the ventral: second dorsal over end of base of anal. Groove at angle of mouth not extending on to the upper jaw. Red Sea, seas of India to the Malay Archipelago, and beyond.

3. *Carcharias Walbeehmii.* A well marked groove at the angle of the mouth extending a short distance along both jaws. The distance between the end of the snout and the mouth equals the interspace between the outer margins of the nostrils. Seas of India to the Malay Archipelago, and Japan.

b. Teeth with smooth edges: those in the centre of the lower jaw smaller than those at the side, the latter being swollen at their bases and having an oblique and narrow cusp. Upper teeth flat and oblique (*Physodon*).

4. *Carcharias Mülleri.* Snout elongated: end of base of first dorsal above origin of the ventral: second dorsal small and posterior to the base of anal. Bengal.

c. Teeth with smooth edges: all narrow and standing on a broad base, the upper being erect or slightly oblique: the lower being erect (*Aprionodon*).

5. *Carcharias acutidens.* Second dorsal as large as the anal and nearly equal in size to the first dorsal. Nostril with a distinct valve inferiorly. Teeth $\frac{27-29}{27-29}$. Red Sea, East coast of Africa, seas of India.

6. *Carcharias tricuspidatus.* Second dorsal nearly as large as the first. Teeth $\frac{32-34}{32-34}$ with a distinct basal cusp on either side. Coasts of Sind to Australia.

d. Teeth with smooth edges, except the bases of the upper ones which are serrated (*Hypoprion*).

7. *Carcharias Macloti.* Snout pointed. The bases of the teeth in the upper jaw serrated on both sides. Seas of India to New Guinea.

8. *Carcharias hemiodon.* Snout rounded. Only the outer sides of the bases of the upper teeth serrated. Seas of India.

e. Some or all the teeth serrated both on their bases and on their cusps (*Prionodon*).

9. *Carcharias sorrah.* Teeth in both jaws serrated. Gill openings wider than the orbit. Seas of India to the Malay Archipelago.

10. *Carcharias Dussumieri.* Teeth in both jaws serrated. Second dorsal not much smaller than the anal. Fins darkish with light edges. Seas of India to the Malay Archipelago.

11. *Carcharias Gangeticus.* Snout obtuse. Teeth in both jaws serrated. Seas of India to Japan: it ascends rivers.

12. *Carcharias melanopterus.* Teeth in both jaws serrated. All the fins black edged. Seas of India to the Malay Archipelago, and beyond.

13. *Carcharias Bleekeri.* Fins, except the first dorsal, with black extremities. East coast of Africa and seas of India.

14. *Carcharias Ellioti.* Teeth coarsely serrated in upper jaw: awl-shaped in lower, some with a basal cusp. Seas of India.

15. *Carcharias menisorrah.* Upper teeth serrated: second dorsal opposite the anal. A black spot on second dorsal. Seas of India.

16. *Carcharias limbatus.* Teeth serrated and on rather a broad base: lower more slender. Ends of some of the fins black. Seas of India and beyond.

17. *Carcharias Temminckii.* Teeth in both jaws slender and from thirty-six to forty in number. India.

a. Teeth with smooth edges: all oblique and without swollen bases (Scoliodon).

1. Carcharias laticaudus. Plate CLXXXVIII, fig. 1.

? Squalus, Russell, Fish. Vizag. i, p. 9, and *Pala-sorrah*, pl. xiv.

Carcharias (Scoliodon) laticaudus, Mull. and Henle, Plagios. p. 28, t. viii; Bleeker, Beng. p. 80; Duméril, Hist. Nat. Poiss. i, p. 343; Kner, Nov. F. p. 414.

Carcharias (Prionodon) palasorrah (Cuvier), Bleeker, Beng. p. 80.

Carcharias (Scoliodon) macrorhynchus, Bleeker, Plagios. p. 31, t. i, f. 1; Duméril, l. c. p. 343.

Carcharias laticaudus, Günther, Catal. viii, p. 358.

Dun-da-nee, Sind.: *Nullian sorrah*, Tel.

Length of preoral portion of snout exceeding the width of the mouth by 1/5, and equal to or slightly above the distance between the eye and the first gill opening (it is still longer in the immature): the groove at the angle of the mouth scarcely extends on to the upper jaw. Nostrils very much nearer mouth than the end of snout. *Teeth*—Those in upper jaw rather oblique not swollen at their bases: those in the lower jaw very oblique especially near the symphysis: none are serrated. *Fins*—The length of the base of the anal fin is nearly or quite equal to its distance from the ventral, especially in the immature: the pectoral does not extend so far as to below the origin of the dorsal, its posterior edge is nearly straight, its internal edge 1/3 of the length of its outer. The caudal equals $3\frac{2}{3}$ to 1/4 of the total length, but is rather longer in adults than in the immature. *Colour*—Uniform gray superiorly, white beneath: the pectoral of a deep gray, having a white outer edge, as have also the ventral and anal, posterior portion of caudal fin dark gray or nearly black.

Habitat.—Seas of India to the Malay Archipelago and beyond. It attains at least two feet in length.

2. Carcharias acutus. Plate CLXXXVIII, fig. 2.

Rüppell, N. W. Fische, p. 65, t. xviii, f. 4; Günther, Catal. viii, p. 358.

Squalus Russellii, Gray and Hardw. Ill. Ind. Zool.

Carcharias (Scoliodon) acutus, Müll. and Henle, Plagiost. p. 29; Richards. Ich. China, p. 194; Cantor, Catal. Mal. Fish. p. 399; Bleeker, Plagiost. p. 30; Duméril, Hist. Nat. Poiss. i, p. 345; Kner, Novara F. p. 414; Klunz. F. R. M. 1871, p. 655.

Purrooway sorrah, Tam.: *Parl sorrah*, Mal.: *Sem sorrah*, Tel.

Length of preoral portion of snout 1/4 longer than the gape of the mouth, and equal to or slightly less than the distance between the eye and the gill-opening: a groove at the angle of the mouth not, or but slightly extending on to the upper jaw. Nostrils nearer to mouth than to the end of the snout. *Teeth*—the upper and lower ones oblique without swollen bases and none serrated. *Fins*—The length of the base of the anal fin is one half, or less, than its distance from the ventral: the pectoral extends to at least below the origin of the dorsal, its posterior edge is concave, and its internal edge about 2/5 the length of its outer: second dorsal small, situated over the posterior half of the anal. Length of caudal fin about $3\frac{1}{2}$ to $3\frac{2}{3}$ in the total length. *Colours*—Gray or bronze above, white below: fins gray, the posterior edge of pectoral, outer edges of ventral, anal and posterior half of caudal, white: upper edge of caudal dark, as is also its posterior lobe.

Habitat.—Red Sea, seas of India to the Malay Archipelago, and beyond: said on the Malabar Coast to attain a considerable size, but the largest I obtained was twenty-nine inches in length. The example figured (eleven inches long) was from Madras.

3. Carcharias Walbeehmii. Plate CLXXXV, fig. 2.

Carcharias (Scoliodon) Walbeehmii, Bleeker, Nat. Tyds. Ned. Ind. x, p. 353.

Carcharias Walbeehmii, Günther, Catal. viii, p. 359.

Ei-dah, Andamanese.

Length of the preoral portion of the snout exceeding the width of the mouth by nearly 1/3, and equalling the distance between the eye and the second gill-opening. A well marked groove at the angle of the mouth extending on to both the upper jaw and along a portion of the mandible. Nostrils rather nearer the mouth than to the end of the snout, the distance between the outer edges of the nostrils equal to the extent between them and the end of the snout. *Teeth*—oblique and flat in both jaws without any serrature. *Fins*—the pectoral extends to nearly beneath the middle of the first dorsal fin, it has its posterior edge rather concave, and its inner edge equals 1/3 of the length of its outer: second dorsal rather small, with its posterior lobe produced, it is situated over the last half of the anal. Length of the base of the anal equal to 2/5 of its distance from the base of the ventral, caudal fin 2/7 of the total length. *Colours*—light brown superiorly becoming dull white beneath. Fins gray and mostly with light outer edges.

Habitat.—Seas of India to the Malay Archipelago and Japan. The example figured (a male, twenty-five inches long) was from Malabar.

b. Teeth with smooth edges, those in the centre of the lower jaw smaller than those at the side: the latter being swollen at their bases and having an oblique and narrow cusp: upper teeth flat and oblique (Physodon).

4. Carcharias Mülleri.

Müller and Henle, Plagios. p. 30, t. xix, f. 1 (*teeth*); Bleeker, Beng. p. 80; Duméril, Hist. Nat. Poiss. i, p. 347; Günther, Catal. viii, p. 360.

Snout elongated and pointed. Nostrils nearer the angle of the mouth than to the end of the snout. Mouth nearly as long as wide. *Fins*—the end of the base of the first dorsal situated opposite the origin of the ventral: second dorsal very small and commencing above the last third of the base of the anal. Pectoral extends to below the origin of the first dorsal. *Colours*—brownish, becoming lighter beneath: fins a little darker.

Habitat.—Bengal.

c. Teeth with smooth edges: all narrow and standing on a broad base, the upper being erect or slightly oblique: the lower being erect (Aprionodon).

5. Carcharias acutidens, Plate CLXXXIX, fig. 1.

Rüppell, N.W. Fische, p. 65. t. xviii, fig. 3; Günther, Catal. viii, p. 361; Klunz. Fische Roth. Meer. 1871, p. 657.

Carcharias (Aprion) acutidens, Müller and Henle, Plagios. p. 33.
Carcharias (Aprionodon) acutidens, Duméril, Hist. Nat. Poiss. i, p. 349.

Snout obtuse and rounded, the length of its preoral portion equal to 2/3 of the width of the mouth and much less than the distance between the eye and the first gill-opening. Nostrils rather nearer mouth than to the end of the snout. A very short groove at the angle of the mouth not extending on to the upper jaw. Eye small. Gill-openings much wider than the orbit. No trace of any spiracle. *Teeth*—$\frac{27-29}{27-29}$, those in both jaws rather slender, erect, or oblique, and with the bases rather swollen, none serrated. *Fins*—the base of the first dorsal situated midway between the inner angle of the pectoral and the commencement of the ventral: second dorsal nearly as large as the first, situated above but rather larger than the anal. Caudal fin $4\frac{1}{2}$ in the total length. Pectoral falciform, its inner edge $3\frac{1}{3}$ times in its outer, it reaches to beneath the middle of the base of the first dorsal. A well-developed pit before the base of the caudal fin. *Colours*—of a dull reddish brown, becoming lightest on the sides and beneath.

Habitat.—Red Sea, coasts of Sind and the Indian Ocean. The example figured is nearly four feet in length, but I have obtained specimens up to six feet.

6. Carcharias tricuspidatus, Plate CLXXXVI, fig. 1.

Odontaspis Americanus, Günther, Catal. viii, p. 392 (*part*).

Length of preoral portion of the snout equal to half the width of the mouth, and not equal to half the distance between the eye and the first gill-opening: no groove at the angle of the mouth. Nostrils nearer to the mouth than to the end of the snout. Gill-openings much wider than the orbit. *Teeth*—$\frac{32-34}{30-34}$, very large, awl-shaped, smooth except at the base, where there exists a small basal cusp on either side. The fourth tooth on either side of the symphysis of the upper jaw very much smaller than those next to it: the central tooth on either side of the symphysis of the mandibles slender. The last few lateral rows in either jaw small. *Fins*—pectoral reaching to below the base of the first dorsal: its inner edge 1/5 of the length of its outer. First dorsal very slightly larger than the second, its base situated nearer to the ventral than to the pectoral. The second dorsal slightly in advance of and about the same size as the anal: length of base of anal equals its distance from the ventral. Caudal fin $3\frac{1}{2}$ in the total length. *Colours*—brown superiorly, becoming dull white beneath.

I obtained several examples of this large shark at Kurrachee and from the coast of Beloochistan, none of which were less than twelve feet in length, while all had a pit at the root of the caudal fin.

Habitat.—Seas of Sind, where they abound—attaining at least twenty feet in length; one on board a native craft measuring that length. The example figured (a skin) is 12 feet 3 inches in length. The teeth are depicted the natural size. A specimen, $10\frac{1}{2}$ feet long, from South Australia is in the British Museum: also several jaws.

d. Teeth with smooth edges except the bases of the upper ones which are serrated (Hypoprion).

7. Carcharias macloti, Plate CLXXXVIII, fig. 2.

? *Squalus*, Russell, Fish. Vizag. i, p. 9, and *Sorra kowah*, pl. xv.
Carcharias (Hypoprion) macloti, Müll. and Henle, Plagios. p. 34, t. x; Duméril, Hist. N. Poiss. i, p. 350.
Carcharias macloti, Günther, Catal. viii, p. 362.

Pala sorrah, Tel.

Length of the preoral portion of the snout exceeding the width of the mouth by 1/3 and equalling the

distance between the eye and the second gill-opening. A short groove at the angle of the mouth, not extending on to the upper jaw. Nostrils nearer to the opening of the mouth than to the end of the snout. *Teeth*—the bases of those in the upper jaw denticulated on both sides: those in the lower jaw erect, with smooth edges and a broad base. *Fins*—the length of the base of the anal is equal to about twice its distance from the base of the ventral: the pectoral extends to nearly as far as to below the hind edge of the first dorsal, its posterior margin is rather concave, its internal equals about 1/3 of the length of its outer edge; caudal $3\frac{1}{4}$ to $3\frac{1}{3}$ in the total length. *Colours*—gray or brown, becoming dull white beneath: the fins gray, the caudal nearly black in its posterior half: outer half of first dorsal dark: pectoral and ventral with a light edge.

Habitat.—Seas of India to New Guinea. The longest example obtained in Malabar, was a little over twenty inches.

8. Carcharias hemiodon.

Carcharias (*Hypoprion*) *hemiodon*, Müll. and Henle, Plagios. p. 35, t. xix, f. 2 (*teeth*); Bleeker, Beng. p. 80; Duméril, Hist. Nat. Poiss. i, p. 351.
Hypoprionodon hemiodon, Gill, Ann. Lyc. Nat. Hist. New York, vii, p. 409.
Carcharias hemiodon, Günther, Catal. viii, p. 362.

Snout obtusely rounded: the distance between the end of the snout and the mouth equals the interspace between the outer angles of the nostrils. No groove at the angle of the mouth. *Teeth*—in the upper jaw oblique, with the outer side of their bases serrated. *Fins*—the pectoral reaches to below the middle of the first dorsal: the second dorsal commences opposite to or rather behind the origin of the base of the anal. Caudal fin equal to $4\frac{1}{3}$ in the total length. *Colours*—gray, becoming lighter beneath.

Habitat.—Seas of India, ascending rivers as the Hooghly at Calcutta.

e. *Some or all the teeth serrated both on their bases and on their cusps* (*Prionodon*).

9. Carcharias sorrah, Plate CLXXXV, fig. 1.

Carcharias (*Prionodon*) *sorrah*, Müll. and Henle, p. 45, t. xvi; Bleeker, Plagios. p. 39 and Bengal, p. 80; Kner, Novara Fische, p. 414; Duméril, Hist. Nat. Poiss. i, p. 368.
Isoplagiodon sorrah, Gill. Ann. Lyc. Nat. Hist. New York, vii, p. 410.
Carcharias sorrah, Günther, Catal. viii, p. 367.

Length of the preoral portion of the snout about equal to the width of the mouth and nearly equal to the distance between the eye and the first gill-opening. No groove at the angle of the mouth. Nostrils about midway between end of snout and mouth. Gill-openings rather wider than the orbit. *Teeth*—$\frac{25}{25}$, those in the upper jaw oblique, serrated, and with a toothed notch on their outer edge: those on lower jaw a little oblique, rather narrow, situated on a broad base and serrated. *Fins*—pectoral falciform, extending to beneath the hind third of the base of the first dorsal fin, its internal margin equalling about 1/4 or 2/7 of its outer. Origin of first dorsal slightly posterior to the base of the pectoral, and not extending to above the ventral. The second dorsal smaller than and slightly posterior to the origin of the anal, the latter rather nearer the caudal than the ventral. Caudal fin $3\frac{1}{4}$ in the total length. *Colours*—dull brown superiorly, and whitish beneath: fins gray, lower caudal lobe and pectorals with black extremities.

Habitat.—Seas of India to the Malay Archipelago. The example figured (18 inches long) was one of Bleeker's specimens received from Dr. Hubrecht, of the Leyden Museum. I captured one of similar size at Mangalore, but which is now in a bad state owing to its having had a quantity of salt enclosed with it.

10. Carcharias Dussumieri, Plate CLXXXVII, fig. 2.

Carcharias (*Prionodon*) *Dussumieri*, (Valenciennes) Müll. and Henle, Plagios. p. 47, t. xix, f. 8; Bleeker, Beng. p. 80; Richards. Ich. China, p. 194; Kner, Novara Fische, p. 414; Duméril, Hist. Nat. Poiss. i, p. 370.
Carcharias (*Prionodon*) *Javanicus*, Bleeker, Plagiost. p. 38; Duméril, l. c. p. 369.
Carcharias Dussumieri, Gunther, Catal. viii, p. 367.

Length of the preoral portion of the snout very slightly exceeding the width of the mouth, and equalling the distance between the eye and the first gill-opening. A very short groove at the angle of the mouth, and only slightly extending on to the upper jaw. Nostrils nearer the opening of the mouth than to the end of the snout. Gill-openings wider than the orbit. *Teeth*—$\frac{25}{26}$, those of the upper jaw oblique and serrated, having a notch on the outer side: those in the mandibles smaller, oblique, narrow, serrated, and with a broad base. *Fins*—pectoral extends to the hind edge of the base of the first dorsal, its posterior margin is slightly concave, its internal margin equals 2/5 of the length of its outer edge. Origin of the first dorsal a very slight distance behind the base of the pectoral, and its base not extending to above the ventral. The second dorsal slightly smaller than the anal. The length of the caudal equals $3\frac{2}{3}$ in the total length. *Colours*—gray or dull brown, becoming white beneath: fins gray with white outer edges: upper two-thirds of second dorsal blackish.

Habitat.—Seas of India to the Malay Archipelago. The example figured was from Malabar.

11. Carcharias Gangeticus, Plate CLXXXVII, fig. 1.

Carcharias (*Prionodon*) *Gangeticus*, Müll. and Henle, Plagios. p. 39, t. xiii; Bleeker, Beng. p. 80; Duméril, Hist. Nat. Poiss. i, p. 359.

Carcharias (*Prionodon*) *Japonicus*, Temm. and Schleg. Faun. Japon, Poiss. p. 302, t. cxxxiii.

Squalus (*Carcharias*) *Gangeticus*, Blyth, J. A. S. of Beng. 1860, p. 36.

Carcharias Gangeticus, Günther, Catal. viii, p. 367, and Ann. Nat. Hist. 1874, p. 36.

Length of the preoral portion of the snout only 2/3 of the width of the mouth, and equalling half of the interspace between the eye and the middle gill-opening: a very slight groove at the angle of the mouth. Nostrils in the front half of the distance between the end of the snout and the mouth. Gill-openings wider than the orbit. *Teeth*—twenty-seven to thirty in either jaw, all being serrated: the superior ones almost triangular, their outer edge with a notch, very distinct in the immature, but becoming almost lost with age: those in the lower jaw narrow, erect, and having broad bases. *Fins*—pectoral elongated, falciform, and extends to beneath the middle of the first dorsal: its internal margin 2/7 of the length of its outer. Origin of the first dorsal slightly posterior to the hind edge of the base of the pectoral, its base not extending to above the ventral. The second dorsal of about the same size as the anal, the latter nearer the caudal than the ventral. Length of the caudal 2/7 of the total length. *Scales*—small and with rough edges: they are hardly above 1/2 the size of those in *C. melanopterus*. *Colours*—gray superiorly, becoming dull white beneath. Fins gray, the pectoral, ventral, and anal with light edges: posterior portion of caudal rather dark.

This is one of the most ferocious of Indian sharks, and frequently attacks bathers even in the Hooghly at Calcutta,* where it is so dreaded that a reward is offered for each that is captured. I have taken it at Cuttack.

The example figured (18 inches long) was from Bombay, and the teeth are exceedingly minute, but under the microscope the notch in the upper teeth and the serrations are visible.

Habitat.—Seas of India to Japan, ascending rivers to above tidal influence. It attains at least seven feet in length. Also recorded from Bagdad.

12. Carcharias melanopterus, Plate CLXXXV, fig. 3.

? *Carcharias melanopterus*, Quoy and Gaim. Voy. Uran. Zool. p. 194, pl. 43, figs. 1 and 2; Rüpp. N.W. Fische, p. 63; Günther, Catal. viii, p. 369: Klunz. F. R. Meer. 1871, p. 658.

Carcharias (*Prionodon*) *melanopterus*, Müll. and Henle, p. 43, pl. 19, fig. 5 (*teeth*); Bleek. Plag. p. 33; Richards. Ich. China, pp. 194, 317; Duméril, Hist. Poiss, i, p. 365; Kner, Novara Fische, p. 415.

Carcharias (*Prionace*) *melanopterus*, Cant. Mal. Fish, p. 400.

Carcharias (*Prionodon*) *Henlei*, Bleek. Nat. Tyds. Ned. Ind. iv, p. 507.

? *Carcharias* (*Prionodon*) *brachyrhynchus*, Bleek. Act. Soc. Sc. Indo-Neerl. vi, p. 206; Duméril, Hist. Poiss. i, p. 364.

Length of the preoral portion of the snout two-thirds the width of the mouth and considerably less than the distance between the eye and the first gill-opening: a very short groove at the angle of the jaws. Nostrils nearer to the extremity of the snout than to the end of the mouth. Snout rounded and very obtuse. *Teeth*—$\frac{2}{2}\frac{4}{4}$-$\frac{2}{2}\frac{5}{5}$($\frac{3}{3}\frac{1}{1}$), the upper broad, flattened, oblique, with a very slight notch or rather concavity on the outer side and serrated: the lower much narrower, pointed, on a broad base and also serrated, these serrations being generally minute, sometimes only on one side of the tooth and are occasionally wanting, especially in the lower jaw. *Fins*—pectoral falciform, extending to beneath the middle or even hind edge of the base of the dorsal, its outer edge three times as long as its internal one. Base of first dorsal a little nearer the pectoral than its posterior end is to the ventral. Second dorsal opposite and similar to the anal. Length of caudal $3\frac{3}{4}$ to $4\frac{1}{4}$ in the total length.† *Scales*—comparatively large, lineated, but with almost smooth edges. *Colours*—brown or bluish-gray superiorly, fading to dull white beneath; ends of all the fins deep black. Iris gray, stained darker superiorly. It may be remarked, as showing the size to which this species attains, that the liver of one at the Government fish-oil factory at Calicut weighed 270lbs.

Habitat.—Seas of India to the Malay Archipelago, and beyond. The example figured (42 inches long), a female, was from the Andamans. This form is very common, having from 24 to 25 teeth only in each jaw.

C. melanopterus, is variously named by the natives: thus Sir W. Elliot received examples termed *Caval sorrah*, *Nella vekal sorrah*, *Raman sorrah*, *Mukhan sorrah*, *Boka sorrah*, and *Ran sorrah*.

13. Carcharias Bleekeri.

Carcharias (*Prionodon*) *Bleekeri*, Duméril, Hist. Nat. Poiss. i, p. 367.

Carcharias bleekeri, Günther, Catal. viii, p. 370.

* Sir Joseph Fayrer informs me that in a case brought to his hospital at Calcutta, the shark not only divided the soft parts down to the thigh bone in a native, but even made a deep groove on the neck of the femur.

† In Quoy and Gaimard's figure the length of the caudal fin is shown as $3\frac{1}{2}$ in the total: but Duméril (l. c.) observes that the "caudale formant à peu près le quart de la longueur totale," and also that the types are in the Museum.

Length of the preoral portion of the snout equal to the width of the mouth. Nostrils midway between the end of the snout and the mouth. *Teeth*—$\frac{25}{23}$, the upper triangular with a slightly notched outer border: the lower nearly erect, narrow, and on a broad base. *Fins*—the dorsal commences a short distance behind the angle of the pectoral: second dorsal opposite to, nearly as long as, but lower than the anal, and elongated posteriorly. Pectoral with its upper edge $4\frac{1}{2}$ to 5 times as long as its lower: caudal 1/4 of the total length. *Colours*—a deep black spot at the lower edge of the end of the pectoral fin: a second at the end of the inferior lobe of the caudal: no black spot on the first dorsal.

The example or rather remnants of the skin, head, and fins of a "half-grown male," which were shown me at the British Museum, as this species from the Seychelles, give eight inches as the distance from the snout to the first gill-opening; the fish when entire would therefore have been about four feet long. The example is very similar to *C. limbatus*.

Habitat.—East coast of Africa, Seas of India.

14. Carcharias Ellioti, Plate CLXXXIX, fig. 2.

Length of the preoral portion of the snout equal to the width of the mouth, but less than the distance between the eye and the first gill-opening. A well-developed labial groove along the outer side of the maxilla, and a slight one on the mandible. Eyes rather small. Nostrils rather nearer mouth than to the end of the snout. Gill-openings much wider than the orbit. No trace of any spiracle. *Teeth*—$\frac{24-26}{30-34}$, the upper nearly triangular without any notch or basal enlargement, very coarsely serrated on both edges: those in the mandible obliquely erect, awl-shaped, becoming smaller and more triangular at the angle of the mouth; the awl-shaped ones have a cusp at either side of the base, below which the outer edge has a few serrations: the external triangular ones are serrated externally. *Fins*—the first dorsal commences just behind the root of the pectoral, its base being nearer to it than to the ventral: second dorsal smaller than the first, but larger than the anal, before which it commences. Pectoral falciform, its internal margin 1/3 of the length of its outer, the fin reaches to beneath the end of the base of the dorsal. Anal below the last two-thirds of the second dorsal. Caudal $3\frac{3}{4}$ in the total length: a well-developed pit before its base. *Colours*—gray superiorly, becoming nearly white beneath.

This species is the one referred to by Jerdon, M. J. L. and Sc. 1851, p. 148.

Habitat.—Seas of India. The example figured (a skin nearly six feet in length) was from Kurrachee, where it is not uncommon. A very good figure of it exists among Sir Walter Elliot's drawings of Madras fish. It is stated to be termed *Puducan* or *Adugu-pal sorrah*, Tamil; and *Pal sorrah* at Vizagapatam.

15. Carcharias menisorrah, Plate CLXXXIV, fig. 1.

Carcharias (Prionodon) menisorrah, Müll. and Henle, Plagios. p. 46, t. xvii; Bleeker, Plagios. p. 35, t. i, f. 3; Duméril, Hist. Nat. Poiss. i, p. 369.

Carcharias (Prionodon) tjutjot, Bleeker, l. c. p. 36, t. i, f. 4; Duméril, l. c. p. 371.

Carcharias menisorrah, Günther, Catal. viii, p. 371; Klunz. Fisch. Roth. Meer. 1871, p. 660.

Carcharias Malabaricus, Day, Jour. Linn. Society, i, 1871, p. 529.

Karamoottee sorrah and *Ciga sorrah*, Tel.

Preoral portion of snout nearly or quite as long as the mouth is wide: the width of the head equals the distance from the angle of the mouth to the end of the snout. A very small groove at the angle of the mouth extending a short distance on to the upper jaw. *Teeth*—twenty-eight in the upper jaw, they are oblique, triangular, notched externally, and serrated in the whole extent of their cusps: lower teeth erect, slender, lanceolate, not serrated and having broad bases. *Fins*—pectoral not so long as head, one fifth longer than broad at its extremity, it is scarcely emarginate, its inner margin equals about half the length of the outer: base of the second dorsal slightly more than half of that of the first dorsal, it is opposite the anal, and almost as large as it. Posterior end of the dorsal fin is at an equal distance from the ventrals as its anterior end is from the root of the pectoral. Upper edge of the caudal almost straight, its length being slightly more than the interval between its base and the origin of the ventral. *Colours*—gray above, white below: upper half of the second dorsal deep black. In Müller and Henle, and in Günther's Catalogue the black is omitted, so it may occasionally be absent: it is adverted to by Bleeker, and also present in a fine specimen I have received from Leyden labelled by Dr. Bleeker.

Habitat.—Red Sea to the Malay Archipelago. The example figured (nineteen inches in length) was from Calicut. It attains twelve feet or more in length.

16. Carcharias limbatus, Plate CLXXXIV, fig. 2.

Carcharias (Prionodon) limbatus, Müll. and Henle, p. 49, t. xix, f. 9 (teeth); Duméril, Hist. Nat. Poiss. i, p. 375.

Carcharias microps, Lowe, Proc. Z. Soc. 1840, p. 38, 1843, p. 93, and Trans. Zool. Soc. iii, p. 18.

Isogomphodon maculipinnis, Poey, Rep. Fis. Nat. i, p. 191, t. iv, f. 2, 3, and ii, p. 245, t. ii, f. 1-3.

Carcharias maculipinnis, Günther, Trans. Zool. Soc. vi, p. 490.

Carcharias (Prionodon) Mulleri, Steind. Sitz. Ak. Wiss. Wien. 1867, lvi, p. 356.

Carcharias limbatus, Günther, Catal. viii, p. 373.
Carcharias Ehrenbergi, Klunz. Fisch. R. Meer. 1871, p. 661.

Length of preoral portion of the snout about equal to the width of the mouth, and is slightly less than the distance between the eye and the first gill-opening: a short groove at the angle of the mouth scarcely extending on to the upper jaw. *Eyes*—small: gill-openings about twice the size of the eye. *Teeth*—erect, somewhat constricted above the base, which is broad, the upper broader than those in the lower jaw, although both are of somewhat similar shape: both serrated, but most distinctly in the upper jaw: in the young the teeth in the mandibles usually appear to have smooth edges, but under the microscope* the rudiments of serrations are perceptible. *Fins*—the length of the base of the anal is equal to about 2/3 of its extent from the base of the ventral: the pectoral extends to below or even to beyond the hind edge of the dorsal fin: its posterior edge is slightly concave: its internal edge is equal to from 3 to $3\frac{1}{3}$ in its outer. Dorsal commences over the inner angle of the base of the pectoral: second dorsal arises above or slightly posterior to the origin of the anal, than which it is somewhat smaller. Length of caudal $3\frac{1}{3}$ to $3\frac{1}{2}$ in that of the total. *Colours*—gray superiorly, becoming white on the sides and beneath. Fins dark gray: in the *immature* (as the example figured) the outer extremity of pectoral, lobe of caudal, and the margins of the fins, dark black: ventral and anal white edged. As age advances, as at two feet, the second dorsal becomes black tipped and the anal has a darker edge.

Habitat.—The example figured (16·8 inches long) was from the Malabar coast of India. It attains at least six feet in length. It is very common along the sea borders of India, and appears to frequent the tropical parts of the Atlantic, the Pacific coast of Central America, and to extend through the Indian Ocean.

17. Carcharias Temminckii.

Carcharias (Prionodon) Temminckii, Müll. and Henle, Plagios. p. 48, t. xviii.
Squalus (Carcharias) Temminckii, Blyth, Journ. As. Soc. of Bengal, 1860, p. 36.
Lamiopsis Temminckii, Gill, Ann. Lyc. Nat. Hist. New York, vii, p. 410.
Carcharias temminckii, Günther, Catal. viii, p. 374.

Length of the preoral portion of the snout equals about 4/5 the width of the mouth. Nostrils nearer to the mouth than to the end of the snout. *Teeth*—$\frac{36-38}{38-40}$, upper rather narrow with a broad base, erect and serrated: the lower erect, entire, awl-shaped: the teeth near the outer angle of the jaws very small. *Fins*—first dorsal inserted midway between the roots of the pectoral and ventral fins: pectoral with its upper edge nearly three times that of the lower. Second dorsal opposite anal, and nearly as large as the first. *Colours*—uniform.

Habitat.—Seas of India.

Genus, 2—HEMIGALEUS, *Bleeker*.

Chænogaleus, Gill.

Spiracles minute and behind the eye. Membrana nictitans present. A pit before the root of the caudal fin both above and below. Snout longitudinally produced. Mouth crescentic, with labial folds. Teeth in the upper jaw denticulated, not so in the lower. The first dorsal fin, which is destitute of a spine, is placed opposite the interspace between the pectoral and ventral: caudal with a single notch.

These fishes have been divided from *Carcharias* on account of the existence of a rudimentary spiracle behind the eye, and likewise by the labial folds being developed in all known species but which is rare in *Carcharias* (see *C. Walbeehmii*, p. 712).

Habitat.—Coromandel coast of India to the Malay Archipelago.

1. Hemigaleus Balfouri, Plate CLXXXV, fig. 4.

Length of the preoral portion of the snout slightly exceeding the width of the mouth, and not quite equalling the distance between the eye and the first gill-opening. Spiracle minute, situated about 1/2 a diameter of the eye posterior to the orbit. A groove at the angle of the mouth extending some distance along either jaw. Nostrils situated nearer to the mouth than to the end of the snout. The distance between the outer angles of the nostrils equal to the width of the mouth. Gill-openings at least twice the width of the orbit. *Teeth*—$\frac{24}{24}$, those in the upper jaw smooth, notched externally, or with about three denticulations along the outer side of the base: those on the lower jaw of a slightly smaller size, erect and smooth. *Fins*—pectoral falciform, extending to below the first third of the base of the dorsal fin, its internal nearly equalling 1/3 of its outer margin. First dorsal (with about 24 rays) having its base almost midway between the end of the base of the pectoral and the origin of the ventral fins. Second dorsal (with about fifteen rays) commencing slightly in advance of the anal, the length of its base equal to rather above 1/2 of that of the first dorsal, while it is rather larger than the anal. Caudal fin equal to about 5 in the total length, and with a distinct pit at its root. *Colours*—dark brown, fins gray, the second dorsal with a dark summit.

* I have examined one example this size in which none of the teeth were apparantly serrated, but if placed under 2-inch power of the microscope serrations are observed to be commencing, the edges of the cusp being crenulated. The black marks on the dorsals, pectoral and caudal, were well marked, but they were absent from the ventral and anal.

The example figured is from Sir Walter Elliot's collection, and was obtained at Waltair, on the Coromandel coast. It is a male 32·5 inches in length. I take this opportunity of dedicating this new fish to Surgeon-General E. Balfour, late of the Madras Medical Service, the scientific founder of the Madras Museum, and who first directed my attention to collecting the fishes of India.

Habitat.—Coromandel coast of India.

Genus, 3—Galeocerdo, *Müller* and *Henle.*

Spiracles small. Membrana nictitans present. Mouth crescentic. Teeth oblique, serrated on either edge, and with a deep notch on the outer margin. The first dorsal spineless, placed opposite the interspace between the pectoral and ventral fins: caudal with a double notch. A pit on the tail, both above and below, at the base of the caudal fin.

Sharks of this genus are much dreaded in India, the native fishermen distinguishing between those forms with long awl-shaped but smooth-edged teeth, from others having elongated or triangular cusps with serrated edges. The former can be captured by lines and even by nets: but the latter immediately cut through nets and sever lines, rendering it necessary to attach the hooks to chains. Sharks seem to prefer their food a little high, and therefore the natives bury the bait in the ground for a day or more before baiting their hooks with it.

Geographical distribution.—Seas of the Tropics, also of temperate and Arctic regions.

SYNOPSIS OF SPECIES.

1. *Galeocerdo Rayneri.* Caudal fin $3\frac{1}{2}$ to 4 in the total length. Teeth $\frac{23}{23}$, denticulated, and of equal size in both jaws. With dark spots. Indian and Australian seas.

2. *Galeocerdo tigrinus.* Caudal fin 3 to $3\frac{1}{4}$ in the total length. Teeth denticulated, and rather smaller in the lower than in the upper jaw. Red Sea, Indian Ocean to Japan, and beyond.

1. Galeocerdo Rayneri, Plate CLXXXVII, fig. 3.

Galeocerdo tigrinus, Gray, Chondrop. p. 54; Blyth, J. A. S. of Beng. 1860, p. 36.

Galeocerdo Rayneri, McDonald and Barron, Proc. Zool. Soc. 1868, p. 368, pl. xxxii; Günther, Catal. viii, p. 377.

Wulluven sorrah, Tam.: *Kettalam sorrah*, Tel.

Length of preoral portion of the snout much less than the width of the mouth. A groove at the angle of the mouth extending some distance along the side of the maxilla: nostrils nearer the end of the snout than the mouth. Gill-openings not so wide as the orbit. Spiracle small. *Eye*—rather large. *Teeth*—23/23, large, of equal size in both jaws, compressed and serrated in their whole extent in both jaws, as well as notched externally above the base. *Fins*—pectoral extends to beneath the anterior third of the first dorsal, it is falciform in shape. Origin of first dorsal a short distance behind the base of the pectoral, but nearer to that fin than to the ventral, which latter is midway between the hind edge of the first dorsal and the origin of the anal. Second dorsal above the anal, the two being of about equal size. Length of the caudal $3\frac{1}{2}$ to 4 in the total length, apparently comparatively decreasing in length with age. *Colours*—dark gray superiorly, becoming dull white beneath; cheeks and lower surface of the snout yellowish. Body, from a short distance behind the gill-openings, with numerous large black spots and vertical bars. Fins gray, the first dorsal with irregular vertical bands.

This fish attains to a considerable size in the Indian seas, where it is not very numerous. It is exceedingly fierce; and Jerdon remarks that it is very cunning and swells itself out so as to appear like a floating mass of animal substance, and having thus decoyed its prey it immediately attacks it. It eats everything, even sea-snakes. Sir W. Elliot observes that he obtained an example of this voracious shark 12 ft. 4 in. long. In its stomach were the remains of fish of various sizes and several shin-bones of beef partially digested. Another example, $8\frac{1}{4}$ feet long, had the remains of a sea-snake (*Hydrus nigrocinctus*) and of a siluroid fish. A fine pair of jaws of this species (15 inches across the gape), from Kurrachee, exists in the British Museum; it is labelled *Carcharias fasciatus ?.*

Habitat.—Indian and Australian Seas; attaining upwards of twelve feet in length.

2. Galeocerdo tigrinus.

? Galeus maculatus, Ranzani, Nov. Comm. Ac. Bonom. iv, 1840, p. 68, t. viii.

Galeocerdo tigrinus, Müll. and Henle, Plagios. p. 59, t. xxiii; Bleeker, Beng. p. 80; Gill, Pro. Ac. Nat. Sc. Phil. 1864, p. 263; Duméril, Hist. Nat. Poiss. i, p. 393; Günther, Catal. viii, p. 378; Klunz. Fisch. Roth. Meer. 1871, p. 663.

Galeocerdo maculatus, Poey, Repert, Fis.-nat. Cuba, 1868, p. 453.

Length of the preoral portion of the snout equal to 1/2 the width of the mouth and slightly less than the distance between the inner angles of the nostrils. A long labial fold along the edge of the upper jaw. *Teeth*—in lower jaw not so large as those in the upper, denticulated in both jaws, and the denticulations at the base of each cusp also serrated, more especially in the lower jaw. *Fins*—the first dorsal commences above the angle of

the pectoral: second dorsal arises slightly in advance of the anal. Caudal 3 to $3\frac{1}{4}$ in the total length, and considerably (one-third) exceeding the length of the interspace between the two dorsal fins. *Colours*—gray superiorly, becoming slightly lighter on the sides and beneath. Numerous brown or dark gray spots over the body.

Habitat.—Red Sea, seas of India to Japan, and beyond.

Second group—Zygænina.

Head produced laterally into the shape of a hammer. Nostrils on front edge of head. Teeth oblique, with a single cusp, having sharp and smooth edges.

Genus, 4—ZYGÆNA,* *Cuvier.*

Cestracion Klein: *Cestrorhinus*, Blainv.: *Sphyrna* (Raf.), Müll. and Henle: *Eusphyrna* and *Reniceps*, Gill.

The anterior portion of the head is broad, flattened, and laterally elongated, with the eyes situated at its lateral extremities and the nostrils at its fore border. A membrana nictitans present. Spiracles absent. Mouth crescentic. Teeth similar in both jaws, oblique and notched. The first dorsal fin spineless, situated above the interspace between the pectoral and the ventral: caudal with one notch, and a pit at the commencement of the fin.

This genus of sharks is reputed to be very dangerous in some localities. The young are captured along the shores of India in large numbers.

SYNOPSIS OF SPECIES.

1. *Zygæna Blochii.* Each lateral expansion of the side of the head two or three times as long as broad. Indian Ocean.

2. *Zygæna malleus.* The length of the hind edge of each lateral expansion of the head nearly or quite equal to its width near the eye. Tropical and temperate seas.

3. *Zygæna tudes.* Anterior edge of head curved but not continuous with the lateral one: the length of the hind edge of each lateral expansion is less than its width near the eyes. Tropical and temperate seas.

1. Zygæna Blochii, Plate CLXXXIV, fig. 4.

Cuv. Règne Anim: Val. Mém. Mus. ix, p. 227, t. xi, f. 2: Bennett, Life of Raffles, p. 694: Cantor, Quart. Med. Journ. Cal. 1837, and Trans. Med. and Phys. Soc. Cal. viii, pt. 2, Appendix, p. ccxi, and Ann. and Mag. 1845, xvi, p. 372; Günther, Catal. viii, p. 380.

Zygæna laticeps, Cantor, Quart. Med. Journ. Cal. 1837, pl. 1-3 (*young*).

Sphyrna Blochii, Müll. and Henle, Plagios. pp. 54, 199; Bleeker, Plagios. p. 41, t. iii, f. 7; Cantor, Catal. Mal. Fish. p. 404; Jerdon, M. J. L. and Sc. 1851, p. 148; Blyth, J. A. S. of Beng. 1860, p. 36.

Koman sorrah, Tam.: *Sappa sorrah*, Tel.

Each lateral expansion of the side of the head from twice to thrice as long as broad, and with a deep groove along the anterior edge, reaching externally nearly as far as the orbit. The posterior edge of the lateral expansion about as long as its anterior edge, while the external edge is nearly straight. Nostril much nearer the mouth than the eye. *Eyes*—situated near the upper angle of the external edge of the lobe of the head. *Teeth*—oblique, externally notched and smooth in their entire extent. *Fins*—the dorsal arises slightly behind the base of the pectoral, extending nearly half way to above the ventral: second dorsal arising above the posterior half of the anal, than which it is much smaller. *Colours*—of a deep gray or brownish-gray, becoming lighter beneath: the fins are usually of a slightly deeper colour than the body.

This is the commonest form on the Malabar coast of India, where the fishermen consider it attains to a very large size. Blyth found it to be also the most common species of the genus on the coast of Bengal, observing that it rarely exceeded four feet in length.

Habitat.—Seas of India to the Malay Archipelago, and beyond. The example figured (17·5 inches long) came from Malabar.

2. Zygæna malleus, Plate CLXXXVI, fig. 4.

Squalus zygæna, Linn. Syst. Nat. p. 399: Bloch, t. cxvii: Bl. Schn. p. 131: Lacép. i, p. 257: Forst. Desc. Anim. Leicht. p. xviii.: Gronov. ed. Gray, p. 6.

Zygæna malleus, Shaw, Nat. Misc. pl. 267; Val. Mém. Mus. ix, 1832, p. 223, pl. xi, f. 1; Cantor, Quarterly Medical Journ. Cal. 1837, f. 1: Temm. and Schleg. Fauna Japon. Poiss. p. 306, pl. cxxxviii: Dekay, New York Fauna, Fish. p. 362, pl. lxii, f. 204: Bleeker, Plagiost. p. 42, t. iii, f. 8: Storer, Mem. Amer. Acad. ix, 1867, p. 229, pl. xxxviii, fig. 3: Couch, Fish. Brit. Isles, i, p. 70, pl. xvi; Günther, Catal. viii, p. 381; Klunz. Fisch. Roth. Meer. 1871, p. 666.

Zygæna Lewini, Griffith, Cuv. Anim. King. x, p. 640, pl. l.

* *Combun sorrah*, Tam.

Sphyrna zygæna, Müller and Henle, Plagios. p. 51; Richards. Ich. China, p. 194; Bleeker, Beng. p. 80; Cantor, Catal. Mal. Fish. p. 401.

Cestracion zygæna, Gill, Ann. Lyc. Nat. Hist. New York, vii, p. 403; Duméril, Hist. Nat. Poiss. i, p. 382; Day, Fish. Malabar, p. 270.

Cestracion Leeuwenii, Duméril, l. c. p. 383.

The hind edge of the lateral expansion of the head nearly equals its width near the eye, and has a groove along almost its entire anterior edge. Nostrils close to the eye. *Colours*—body and fins slaty-gray: under surface white.

Habitat.—Tropical and temperate seas.

3. **Zagæna tudes**, Plate CLXXXVIII, fig. 4.

Squale pantouflier, Lacépède, i, p. 261, t. vii, f. 3.

Squalus zygæna, Russell, Fish. Vizag. i, p. 8, and *Koma sorra*, pl. xii.

Zygæna tudes, Cuv. Règne Anim.; Val. Mém. Mus. ix, p. 225, pl. ii, f. 1; Günther, Catal. viii, p. 382.

Sphyrna tudes, Müll. and Henle, Plagiost. p. 53; Müll. and Trosch. in Schomburgh, Brit. Guian. iii, p. 642.

Cestracion tudes, Duméril, Hist. Nat. Poiss. i, p. 384.

Anterior edge of head curved, but the front margin is not continuous with the lateral one: the length of its hind margin less than its width near the eye. *Eyes*—situated just below the junction of the anterior and outer edges of the snout. Nostril close to the eye, and a groove running along the anterior edge of the head. *Teeth*—oblique, with a notched outer edge. *Fins*—dorsal arises above the hind margin of the inner edge of the pectoral fin, its height equals the length of the pectoral: second dorsal over the hind half of the anal: length of the base of the anal extends 2/3 of the distance to the ventral: caudal 3 to $3\frac{1}{3}$ in the total length. *Colours*—Gray, becoming lighter beneath: first dorsal fin very dark, the upper portion of the second dorsal and the lower caudal lobe deep black in newly captured examples, the colour fading after they have been some time in spirit. One example, captured at Cochin, Dec. 27th, 1872, besides the black marks on the fins mentioned, had the hind edge of the dorsal and the end of the pectorals dark.

Habitat.—Mediterranean, Indian Ocean and Archipelago, also tropical parts of the Atlantic. It attains several feet in length.

Third group—Mustelina.

Teeth small, having a central, and one or two smaller lateral cusps: or the teeth may be obtuse.

Genus, 5—Triænodon, *Müller* and *Henle*.

No spiracles. Membrana nictitans present. Mouth crescentic, with a pit behind its angle. Teeth numerous in both jaws and consisting of one central cusp and a smaller lateral one on either side. First dorsal spineless placed opposite the interspace between the pectoral and ventral fins. Lower caudal lobe distinct. A pit at the root of the caudal fin.

Triænodon obtusus, Plate CLXXXIX, fig. 3.

Snout short and rounded, the distance between the mouth and the end of the snout equals about 1/2 the width of the mouth. Nostrils nearer end of snout than the mouth, each with a flap. Eye of moderate size. Gill-openings rather wider than the orbit. No spiracle. *Teeth*—with one central and a small lateral cusp on either side. *Fins*—the first dorsal commences behind the inner angle of the pectoral and its base does not extend to above the ventral. Second dorsal not quite 1/2 as large as the first and situated above the anal. Pectoral reaches to below the middle of the first dorsal: caudal fin nearly 1/4 of the total length. *Colours*—dark above, becoming lighter beneath.

This species is allied to *T. obesus*, Rüppell, but its first dorsal fin is more advanced, and its second dorsal considerably smaller than shown in Rüppell's figure or the examples in the British Museum.

Habitat.—One example, nineteen inches in length, was obtained at Kurrachee: it is a young male.

Genus, 6—Mustelus, *Cuvier*.

Membrana nictitans present. Small spiracles behind the eyes. Mouth crescentic, with long labial folds. Teeth small, numerous, similar in both jaws, pavement like, obtuse or with indistinct cusps. The first dorsal fin spineless, situated above the interspace between the pectoral and ventral: the second nearly as large as the first: caudal without a distinct lower lobe, and no pit at the commencement of the fin.

Geographical distribution.—Seas of tropical and temperate regions. Not recorded from the Red Sea.

Mustelus manazo, Plate CLXXXVI, fig. 3.

Mustelus vulgaris, Temm. and Schleg. Fauna Japon, Poiss. p. 303, t. cxxxiv.

Mustelus manazo, Bleeker, Japan, p. 126; Gunther, Catal. viii, p. 387.

Pa sorrah, Tel.

Snout produced and pointed, the length of its preoral portion equalling the width of the mouth (or 1/4 more in the fœtus), which latter is somewhat angular. A well-developed labial fold at the angles of the mouth: membrana nictitans very distinct. Spiracle behind and much smaller than the eye. *Teeth*—rhombic, and destitute of any distinct cusp. *Fins*—the first dorsal arises opposite the posterior end of the base of the pectoral, and does not extend to above the anal: the second dorsal smaller than the first, but the length of the bases of the two about the same. Pectoral reaches to below centre of first dorsal: anal commences beneath the posterior half of the second dorsal and is smaller than it. Caudal equal to $4\frac{1}{2}$ in the total length, its lower lobe moderately developed and notched. *Colours*—reddish gray superiorly, becoming dull white beneath. Posterior extremity of the caudal of a dark colour.

Habitat.—Seas of India to Japan. I obtained a female (16·5 inches in length) at Kurrachee, and which had several young inside. The one figured, from the same place, is 27 inches in length.

FAMILY, II—LAMNIDÆ.

Spiracles, if present, minute. No membrana nictitans. Mouth inferior and crescentic. Nostrils not communicating with the mouth. First dorsal spineless, and placed opposite the interspace between the pectoral and ventral fins: an anal fin present.

I have (p. 713) described a shark, *Carcharias tricuspidatus*, the teeth of which so closely resemble those seen in *Odontaspis*, that specimens have been erroneously referred not only to that Genus but to the *O. Americanus*. The absence or presence of the pit at the root of the caudal fin is one character which at once distinguishes the two forms, for if they were identical species the character of the pit at the base of the caudal fin as a distinguishing guide would have to be given up, not only as a generic but even as a specific character.

Genus 1—LAMNA, *Cuvier*.

Oxyrhina, Agassiz.

Spiracles, if present, minute. No membrana nictitans. Mouth wide. Gill-openings large. Teeth large, awl-shaped, smooth or sometimes with a small lateral basal cusp on either side. The first dorsal fin spineless, placed opposite the interspace between the bases of the pectoral and ventral fins. Lower caudal lobe large. A keel along the side of the tail. A pit at the base of the caudal fin.

1. Lamna Spallanzanii, Plate CLXXXVI, fig. 2.

Lamna punctata, Storer, Bost. Journ. Nat. Hist. ii, 1839, p. 534, pl. viii, f. 2, and Mem. Amer. Acad. ix, 1867, p. 225, pl. xxxvii, fig. 1; Dekay, New York, Fauna, Fish. p. 352, pl. lxiii, f. 206 (not Mitchell); Poey, An. Soc. Esp. v, p. 381, t. xiv, fig. 1.

Oxyrhina Spallanzanii, Bonap. Faun. Ital. Pesc. t. cxxxvi, f. 1; Duméril, Hist. Nat. Poiss. i, p. 408.

Oxyrhina gomphodon, Müller and Henle, Plagiost. p. 68, t. xxviii.

Isuropsis Dekayi, Gill, Ann. Lyc. Nat. Hist. New York, vii, p. 409.

Oxyrhina punctata, Duméril, l. c. p. 409.

Lamna spallanzanii, Günther, Catal. viii, p. 390; Klunz. Fische Roth. Meer. 1871, p. 669.

Snout pointed, angle of the mouth about midway between the nostril and the first gill-opening. Gill-openings very wide. *Teeth*—$\frac{13}{13}$ on either side, awl-shaped, with sharp but entire lateral edges, and destitute of basal cusps: the third on either side of the symphysis of the upper jaw smaller than those on either side of it. *Fins*—the base of the first dorsal rather nearer the pectoral than the ventral fin. Pectoral falciform, its inner being one-fourth of the length of its outer margin. Second dorsal and anal small, situated opposite one another. The keel on the side of the tail commences anterior to the base of the second dorsal and anal fins. *Colours*—gray, becoming lighter beneath.

Habitat.—Red Sea and Indian Ocean, also the Atlantic and Mediterranean. The figure is from one of Sir W. Elliot's drawings, which was taken from an example captured at Madras. It attains to a very large size.

Family, III—NOTIDANIDÆ.

Spiracles small and on the side of the neck. No membrana nictitans. Gill-openings six or seven. A single spineless dorsal fin placed nearly opposite to the anal: lower caudal lobe present. No pit at the root of the caudal fin.

Genus, 1—Notidanus, *Cuvier.*

Hexanchus and *Heptanchus*, Rafin.: *Monopterhinus*, pt. Blainv.

Spiracles small and on the side of the neck. No membrana nictitans. Mouth crescentic. No labial fold. Gill-openings six or seven, and wide. Teeth in the upper jaw consisting of one or two pairs that are awl-shaped, followed by six broader ones, which have one strong and several smaller cusps. In the lower jaw six large comb-like ones on either side, and some smaller lateral ones. A single, spineless, dorsal fin placed opposite the anal: lower caudal lobe present. No pit at the root of the caudal fin.

Geographical distribution.—Seas of tropical and temperate regions.

Notidanus Indicus, Plate CLXXXIX, fig. 4.

Cuv. Règn. Anim.: Agassiz, Poiss. Foss. iii, pp. 92, 217, t. E. f. 1 (*teeth*); Günther, Catal. viii, p. 398.

Heptanchus Indicus, Müll. and Henle, Plagiost. p. 82, t. xxxii (*teeth*); Temm. and Schleg. Fauna Japon. Poiss. p. 303; Duméril, Hist. Nat. Poiss. i, p. 434; Macdonald and Barron, P. Z. S. 1868, p. 371, pl. xxxiii.

Notorhynchus maculatus, Ayres, Proc. Calif. Ac. Nat. Sc. i, p. 72; Gill, Proc. Ac. Nat. Sc. Phil. 1862, p. 495. and 1864, p. 149.

Heptanchus maculatus, Girard, U. St. Pacif. Exp. Fish. p. 367.

Notorhynchus borealis, Gill, l. c. 1864, p. 150.

Snout rounded and obtuse. Cleft of mouth wider than deep. *Teeth*—opposite the symphysis of the upper jaw is a tooth having a single cusp, those on either side being stronger and denticulated. The central tooth in the lower jaw has no median, but two or three lateral cusps on either side. *Colours*—gray, with dark blotches and marks.

Sir W. Elliot obtained an example at Madras, and had a figure taken of it.

Habitat.—Seas of India and South Africa to California. The figure is from a stuffed example in the British Museum, about 4½ feet in length.

Family, IV—SCYLLIIDÆ.

Spiracles present. Eye without any nictitating membrane. Mouth inferior. Teeth small, several rows being generally in use. The first dorsal fin spineless, placed above or behind the ventrals: an anal present, which may be in front of, below, or behind the second dorsal.

SYNOPSIS OF INDIAN GENERA.

A.—Nasal and buccal cavities separate.

1. *Scyllium.* The upper edge of the caudal fin smooth.

B.—Nasal and buccal cavities confluent.

2. *Ginglymostoma.* Small spiracles behind the eyes. The second dorsal and anal fins are nearly opposite one another, p. 725.
3. *Stegostoma.* Snout obtuse. Caudal portion of body and fin very long, p. 725.
4. *Chiloscyllium.* No appendages on the head. Spiracles below the eye and well developed. Anal fin some distance posterior to the second dorsal, p. 726.

A.—Nasal and buccal cavities separate.

Genus, 1—Scyllium, *Cuvier.*

Scylliorhinus, Halælurus, Poroderma, and *Cephaloscyllium,* Gill.

Spiracles behind the eye. Nasal and buccal cavities distinct. Teeth small, in several rows: usually with a central and one or two lateral cusps. Origin of anal fin in advance of that of the second dorsal: upper edge of caudal not serrated.

These sharks, or " dog fishes," do not attain to any large size, but are much dreaded by fishermen, as they get entangled in their nets, from which great injury occurs. Their eggs are similar to those of the Rays.
Habitat.—Tropical and temperate seas.

SYNOPSIS OF SPECIES.

1. *Scyllium marmoratum.* Nasal valves confluent with a single transverse uninterrupted flap and a well-developed labial fold. Brown spots, bands, or ocelli. Seas of India to the Malay Archipelago, and beyond.
2. *Scyllium Capense.* Nasal valves not confluent and separated from one another by a considerable interspace. Dark, lighter beneath. Seas of India to the Cape.

1. Scyllium marmoratum, Plate CXC, fig. 2.

Bennett, Life of Sir S. Raffles, p. 693; Günther, Catal. viii, p. 400.
Scyllium maculatum, Gray and Hardw. Ind. Zool.; Richards. Ich. China, p. 193; Müller and Henle, Plagios. p. 5, t. vii; Cantor, Catal. Mal. Fish. p. 391; Bleeker, Plagios. p. 16, and Beng. p. 80; Duméril, Hist. Nat. Poiss. i, p. 319; Kner, Nov. Fisc. p. 412 (not Bl. Sch.).

Length of the snout equals the width of the mouth. Nasal valves confluent in the form of a single broad flap, with a free posterior edge, and no cirrus. A well developed labial fold. Gill-openings as wide as the orbit. *Teeth*—small. *Fins*—first dorsal commences just behind the ventral: the second dorsal slightly larger than the first and has the anal beneath its anterior 1/2 or 2/3. *Colours*—of a tawny brown, becoming lighter beneath. Lines of spots, some of which occasionally become confluent, exist along the body: there may also be bands or ocelli.

This species, so far as I am aware, does not appear to be common in India, where I never met with an example.

Habitat.—Seas of India to the Malay Archipelago. The figure is taken from Hardwicke's type of *Scyllium maculatum,* 18 inches in length, and still in the British Museum.

5. Scyllium Capense, Plate CXC, fig. 1.

Müller and Henle, Plagiost. p. 11; Duméril, Hist. Nat. Poiss. i, p. 320; Günther, Catal. viii, p. 404.

Snout obtuse. Nasal valves distinct, separated from one another by a considerable interspace, and having no prominent cirrus. No labial fold to the upper jaw, but a short one on the lower. Gill-openings narrow, not

so wide as the orbit. *Teeth*—minute. *Fins*—the first dorsal is inserted rather nearer the anal than to the base of the ventral: the second dorsal situated entirely behind the anal. *Colours*—brown, lightest beneath. Body with light vertical bands and some white blotches.

Habitat.—The only reason for recording this as an Indian species is due to an example at the British Museum being thus marked, and from which the figure is taken. It is stuffed and about 40 inches in length.

B.—Nasal and buccal cavities confluent.

Genus, 2—GINGLYMOSTOMA, *Müller* and *Henle*.

Nebrius, Rüppell.

A minute spiracle behind the eye which also is minute. A quadrangular flap formed before the mouth by the conjoined nasal valves, and which has a free cirrus on either side. A superior and an inferior lip, the latter not extending across the symphysis. Nasal and buccal cavities confluent. Teeth either in many rows with a strong median and one or two smaller lateral cusps: or else in merely about three rows of which the foremost only is in use, and each tooth with a convex and serrated edge. Fourth and fifth gill-openings situated close together. Dorsal fins spineless, the first above or behind the ventrals, the second rather in advance of or opposite to the anal.

Habitat.—Red Sea, Indian Ocean to the Malay Archipelago; also tropical parts of the Atlantic.

1. Ginglymostoma Mülleri.

Ginglymostoma concolor, Müll. and Henl. Plagios. p. 22, t. vi (not Rüppell); Bleeker, Beng. p. 80; Duméril, Hist. Nat. Poiss. i, p. 334.

Ginglymostoma Mülleri, Günther, Catal. viii, p. 408; Klunz. Fisch. R. Meer. 1871, p. 670.

Snout very short, its length not equalling the width of the mouth. Nasal cirrus short, reaching to the edge of the upper lip. *Teeth*—in many rows, each with a large central cusp, and three or four lateral ones on either side. *Fins*—first dorsal opposite the ventral, angles of all the paired fins pointed: second dorsal slightly in advance of the anal, but rather smaller than it or than the first dorsal. Caudal nearly 1/3 of the total length.

Habitat.—India. Said to attain $8\frac{1}{2}$ feet in length.

Genus, 3—STEGOSTOMA. *Müller* and *Henle*.

Spiracles about the size of the small eye behind which they are situated. Fourth and fifth gill-openings close together. Nasal and buccal cavities confluent. Snout obtuse: upper lip thick with a cirrus on either side. A well-developed labial fold round the angle of the mouth. Teeth small, sometimes trilobed, the dental plate being almost quadrangular. Two spineless dorsal fins, the first above the ventral, the second anterior to the anal, which is near the caudal, the latter being very elongate.

Geographical distribution.—From the Red Sea and East coast of Africa, through the seas of India to the Malay Archipelago, and Formosa.

1. Stegostoma tigrinum, Plate CLXXXVII, fig. 4 (*young*).

Squalus tigrinus, Gmel. Linn. p. 1493; Lacép. i, p. 249; Forst. Zool. Ind. p. 24, t. xiii, f. 2; Pennant, Ind. Zool. p. 55, t. xv, f. 1.; Russell, Fish. Vizag. i, p. 11, and *Pollee makum*, pl. xviii (*young*).

Squalus longicaudus, Gmel. Linn. p. 1494.

Squalus fasciatus, Bloch, t. cxiii; Bl. Schn. p. 130 (*young*).

Squale tigre, Lacép. t. i, p. 249.

Scyllium heptagonum, Rüppell, N.W. Fische, p. 61, t. xvii, f. 1.

Stegostoma fasciatum, Müll. and Henle, p. 25, t. ii; Cantor, Catal. Mal. Fish. p. 396; Bleeker, Plagios. p. 23, and Beng. p. 80; Jerdon, M. J. L. and Sc. 1851, p. 148; Blyth, Journ. As. Soc. of Bengal, 1860, p. 35; Duméril, Hist. Nat. Poiss. i, p. 336; Günther, Fish. Zanz. p. 140; Klunz. Fische Roth. Meer. 1871, p. 672.

Stegostoma carinatum, Blyth, Journ. Ass. Soc. of Beng. xvi, 1847, p. 725, pl. xxv, fig. 1.

Squalus cirrosus, Gronov. ed. Gray, p. 6.

Stegostoma tigrinum, Günther, Catal. viii, p. 409.

Pollee-makum, *Komrasi* and *Oorookoolti sorrah*, also *Potrava* (*when young*) Tel.; *Corungun sorrah*, "monkey-mouthed shark," Tam.

Head as broad as long. *Eye*—small, with the spiracle just behind it. Upper lip very thick, like a quadrangular pad, with a barbel on either side. A distinct labial fold round the angle of the mouth, which is slightly nearer the eye than to the end of the snout. *Teeth*—small, and trilobed. *Fins*—the origin of the first dorsal is a little posterior to the base of the ventral, it is about as high in front as its base is long, and larger than the second dorsal, which commences a short distance behind it and anterior to the anal. Caudal fin very long, being about 1/2 of the total length and with notch near its lower extremity. A low median, tubercular dorsal ridge, and sometimes another on either side of dorsal fin. *Colours*—(*young*) white or buff, which are in the form of markings, the fish appearing black, with narrow white lines or bands across the head and body, between which are white spots: these take on various forms in different examples. *Adults*—tawny, or with more or less transverse bands of rounded spots, the colour of the fish being brownish.

The favourite food of this fish is Molluscs and Crustacea.

Habitat.—Red Sea, East coast of Africa, seas of India to the Malay Archipelago, and beyond; attaining at least 6 feet in length. It is common at Madras, where the example figured (12 inches long) was captured.

Genus, 4—CHILOSCYLLIUM, *Müll.* and *Henle.*

Hemiscyllium, Müll. and Henle.

Spiracle below the eye. Fourth and fifth gill-openings close together. Nasal and buccal cavities confluent: nasal valve with a barbel. Lower lip continuous or interrupted in the centre. Teeth small, triangular, with or destitute of, lateral cusps. Two spineless dorsal fins, the first above or behind the ventrals, the second considerably anterior to the anal, which is near the caudal.

Geographical distribution.—Seas of India to the Malay Archipelago, and Australia.

SYNOPSIS OF INDIVIDUAL SPECIES.

1. *Chiloscyllium Indicum*—Lower lip with the labial fold uninterrupted: angle of mouth nearer eye than end of snout. Dark cross-bands, sometimes enclosing white spots: or even uniform brown. Seas of India to the Malay Archipelago, and beyond.

1. Chiloscyllium Indicum, Plate CLXXXVIII, fig. 3.

Squalus Indicus, Gmel. Linn. i, p. 1503; Bl. Schn. p. 137.
Squale dentelé, Lacépède, i, p. 281, t. xi, f. 1.
Squalus Gronovianus, Lacépède, i, p. 280.
Squalus tuberculatus, Bl. Schn. p. 137.
Squalus, Russell, Fish. Vizag. i, p. 10, and *Bokee-sorrah* or *Ra-sorrah*, pl. xvi.
Scyllium plagiosum, Bennett, Life of Sir S. Raffles, p. 694.
Scyllium ornatum, Gray and Hardw. Ind. Zool.
? *Scyllium freycineti*, Quoy and Gaim. Voy. Uranie, Poiss. p. 192.
Chiloscyllum plagiosum, and *tuberculatum*, Müll. and Henle, pp. 17, 19; Cantor, Catal. p. 392; Jerdon, M. J. L. and Sc. 1851, p. 148; Bleeker, Plagios. pp. 17, 20, and Beng. p. 80; Duméril, Poiss. i, pp. 328, 331; Day, Fish. Mal. p. 267; Kner, Novara Fische, pp. 412, 413.
Scyllium griseum, Müll. and Henle, p. 19, t. iv.
Squalus caudatus, Gronov. ed. Gray, p. 8.
Scyllium Hasseltii and *phymatodes*, Bleeker, Plagios. pp. 19, 21; Duméril, l. c. p. 331.
Hemiscyllium Malayanum, Bleeker, Nat. Tyds. Ned. Ind. vii, p. 376 (not Less.)
Synchismus tuberculatus, Gill, Ann. Lyc. Nat. Hist. New York, 1861, pp. 408, 413, t. vii.
Chiloscyllium indicum, Günther, Catal. viii, p. 411.
Corungun sorrah, Tam.: *Ettee*, Mal.: *Poos-hee*, Belooch.

Head rather depressed and flatter inferiorly than superiorly. *Eyes*—small, with the spiracle (which is of about the same size) below and slightly posterior to it. Lips surround the mouth, the lower labial fold being continuous: the mouth at its angle 1/3 nearer the eye than to the end of the snout, which is obtuse. Nasal valve with an elongated barbel. *Teeth*—small, triangular, with lateral cusps. *Fins*—the origin of the first dorsal is just posterior to the base of the ventral, anteriorly it is slightly higher than long at its base, which latter distance equals the length between the two dorsal fins, both of which have their anterior and upper edges rounded: the second fin being somewhat smaller than the first and ending some distance anterior to the origin of the anal. Anal notched, terminating close to the caudal fin, which is also notched posteriorly, and about $5\frac{1}{2}$ in the total length. From one to three smooth or tubercular ridges may exist along the back, or such may be entirely absent. *Colours*—these vary exceedingly: they are usually gray with dark, or even black, cross-bands, which may or may not include white spots: sometimes the cross-bands break up into spots or bands, having dark edges: or the fish is simply of a reddish brown colour.

Habitat.—Seas of India to the Malay Archipelago, and beyond.

SUB-ORDER, II—BATOIDEI.

Spiracles present: gill-openings in five pairs, and on the ventral surface of the body. Body depressed, forming, due to largely-developed pectoral fins, a more or less flat disk, and having usually a thin and slender tail. Dorsal fin, when present, in the caudal portion of the body: anal absent.

Skates and rays exist in enormous numbers in the Indian seas, where they attain to a great size, and some are dreaded by fishermen because of the wounds inflicted by their caudal spines, while others cause great injury to the oysters. Skates are gregarious, and may suddenly arrive to the dismay of the owner of an oyster bed, as they appear to remain so long as any molluscs are to be obtained. Rays lie concealed in the sand, and are reputed to be able to suddenly encircle fish or prey swimming above them with their long whip-like tails, and then wound them with their serrated tail spine. Their skins were formerly valuable as shagreen, being considered superior to those of sharks, owing to the scales being of somewhat larger dimensions. Irrespective of being employed for shagreen, they are occasionally used as rasps or sand-paper, to give the first surface to wood or horn which it is desired to polish. Their fins are exported along with those of the sharks to China, where they are used for soups, while from their livers an oil is extracted.

The thin horny cases, inside which are the fœtal rays, are more square in form and comparatively smaller than what are observed among the sharks. Many of these cases are square, with a horn-like projection from each corner.

SYNOPSIS OF FAMILIES.

I. PRISTIDÆ. A flattened snout, having lateral teeth, rendering it saw-like, p. 728.

II. RHINOBATIDÆ. Pectoral fins not continued to the snout. Trunk gradually passing into the tail, which has two dorsals and a caudal fin, p. 730.

III. TORPEDINIDÆ. Trunk a broad smooth disk. Usually dorsal and caudal fins. An electric organ, p. 733.

IV. RAJIDÆ. Trunk a broad and generally a rough disk. Pectoral fins extend on to the snout. A fold along either side of the tail: no serrated caudal spine. No electric organ, p. 735.

V. TRYGONIDÆ. Pectoral fins extend on to and are confluent at the snout. No fold along side of tail: which latter is usually armed with a serrated spine, p. 736.

VI. MYLIOBATIDÆ. Pectoral fins do not extend on to the side of the head: snout with a detached pair of fins, p. 742.

Family, I—PRISTIDÆ.

Saw-fishes.

Snout much produced, flattened, and having a saw-like appearance, due to the existence of large teeth on its lateral edges.

Dr. J. E. Gray (Proc. Zool. Soc. 1864,* p. 163), described the endoskeleton of one of these teeth forming the saw, but without recognising from whence it had been derived. Professor Kölliker having examined the same specimen microscopically, ascertained it to be part of the endoskeleton of a Plagiostome. The endoskeleton of a tooth of the saw consists of from three to five hollow tubes, tapering towards their extremity, and covered with an osseous deposit which is perforated with fine holes. These teeth vary both in size and number in the same species, rendering them unsuitable as specific, but admissible as individual distinctions.

Great injuries are inflicted by these fishes, which strike sideways with their formidable snouts; and although not personally a witness to the fact, I have been informed on native authority, that large ones have been known to cut a bather entirely in two. The largest example I saw was off the coast of Sind (*Pristis zysron*): it measured over 16 feet, the rostrum being 4 ft. 2 in. in length. A *P. cuspidatus*, 14 feet long, captured at Calicut, was found to have a liver weighing 185 lbs. which was taken to the oil factory when I was present.

At Gwadur, on the Meckran coast, I found that the fishermen of all religions presented the saws of these fishes at a small temple, where they were hung up inside or piled round the outside. The priest was expected to pray for success in their takes and a safe return to shore. At the Andaman Islands the Aborigines wishing to make a suitable offering to Mr. Homfray, their superintendent, attacked an enormous saw-fish, which they harpooned, and eventually secured at the risk of their lives. They presented him with the rostrum.

Geographical distribution.—Seas of tropical and temperate regions. The Family consists of a single Genus.

Genus, 1—Pristis, *Latham.*

Body elongated and depressed. Gill-openings inferior and of moderate width. Spiracle wide and posterior to the eye, which latter has no nictitating membrane. Nostrils inferior. Teeth minute and obtuse. Dorsal fin spineless, the first quite or nearly opposite the ventrals: front edge of pectoral free.

SYNOPSIS OF SPECIES.

A.—*Caudal fin with a distinct lower lobe.*

1. *Pristis cuspidatus*—From twenty-three to thirty-five pairs of broad teeth on the snout, but none present on its basal fourth or fifth: in the young their hinder edge is barbed. Dorsal fin arises behind the root of the ventral: caudal with a lower lobe. Seas of India to the Malay Archipelago, ascending rivers.

B.—*Caudal fin without any distinct lower lobe.*

2. *Pristis Perrotteti*—From seventeen to twenty pairs of teeth on the rostrum, commencing at its base. Dorsal fin almost entirely in advance of ventrals. No distinct lower caudal lobe. Tropical seas, entering rivers.

3. *Pristis Zysron*—From twenty-five to thirty-two pairs of teeth on the rostrum, commencing near its base. Dorsal fin almost entirely posterior to the ventrals. No lower caudal lobe. Seas of India to the Malay Archipelago.

A.—*Caudal fin with a distinct lower lobe.*

1. Pristis cuspidatus, Plate CXCI, fig. 3.

Pristis cuspidatus, Latham, Trans. Linn. Sc. 1794, ii, p. 279, pl. 26, fig. 3 (rostrum); Bl. Schn. p. 351: Müll. and Henle, p. 107; Duméril, Hist. Nat. Poiss. i, p. 476; Günther, Catal. viii, p. 439.

Squalus pristis, Russell, Fish. Vizag. i, p. 8, and *Yahla*, pl. xiii.

Pristis semisagittatus, Shaw, Zool. v, 2, p. 361; Müll. and Henle, p. 108, pl. lx (mouth); Cant. Catal. Mal. Fish. p. 407; Swainson, Fishes, ii, p. 319; Bleek. Beng. p. 80, and Plag. p. 53; Duméril, l. c. p. 477; Day, Fish. Malabar, p. 272.

Rostrum narrow and of about the same width throughout, armed with from twenty-three to thirty-five

* See *Myriosteon Higginsii* Ann. and Mag. Nat. Hist. 1870, v, p 366.

pairs of broad teeth, those on one side (generally the right) often exceeding in number those on the other. This teething is absent in the fœtus, while in the immature it only exists in the anterior 3/4 of the snout, and in the adult a considerable portion of the base is unarmed. Usually the anterior six pairs of teeth are opposite one another, and the posterior teeth in the immature are mostly barbed behind. Mouth transverse, with a membranous valve (fringed in the young) behind the teeth in the upper jaw, and with a deep notch near the symphysis. The pupil is transverse, with a semi-circular flap above and another below; these flaps are easily raised, depressed, or expanded, according to the stimulus of light received, which they can partially or entirely exclude: lens very soft. Spiracles large, nearly transverse, posterior to the eyes, half a diameter of the eye in width. Nostrils situated about one-and-a-half transverse lengths from the mouth: they have long triangular narrow valves in their upper, and a hemlike one at their lower margins: their distance asunder posteriorly equals their length, and is twice as much anteriorly. *Teeth*—small, longer than broad. *Fins*—the first dorsal commences just behind the ventral: the second dorsal midway between the posterior extremity of the first dorsal and the base of the caudal. The two dorsals are of equal size, their upper margins concave, and the posterior lobe of each produced. Posterior margin of the caudal deeply excavated so as to form two lobes. A keel passes along the tail, dividing the lateral from the abdominal surfaces. *Colours*—grayish-yellow above, whitish beneath. Iris golden, with a black edge.

Habitat.—Seas of India to the Malay Archipelago: ascending rivers. Attaining 20 feet and upwards in length. The flesh is equally esteemed with that of the sharks. The fins are prepared and sent to China: oil is extracted from the livers, whilst the skins are useful for sword scabbards or for smoothing down wood. The example figured, a little over 3 feet in length, was from Madras.

B.—*Caudal fin without any distinct lower lobe.*

2. Pristis Perrotteti, Plate CXCI, fig. 1.

? *Pristis microdon*, Latham, Trans. Linn. Soc. 1794, ii, p. 280, t. xxvi, f. 4 (*rostrum*).

Pristis Perrotteti, Müll. and Henle, Plagios. p. 108; Duméril, Hist. Nat. Poiss. i, p. 474; Günther, Catal. viii, p. 436.

Pristis antiquorum, Costa, Fauna Regn. Nap. Pesc. t. viii, ix; Blyth, J. A. S. of Beng. 1860, p. 36.

Pristis microdon, Bleeker, Beng. p. 80, and Plagios. p. 54.

Rostrum of moderate breadth, rather narrow anteriorly, armed with from seventeen to twenty pairs of teeth, mostly of about the same number on either side, and commencing at the base of the snout: the first four pairs being opposite one another, and the breadth of the base of each anteriorly being about equal to 1/3 of the interspace. Spiracles placed very obliquely, from 1 to $1\frac{1}{4}$ diameters behind the orbit. *Teeth*—larger than in *P. cuspidatus* or *P. zysron*, oval, longer than broad. *Fins*—the first dorsal almost entirely in advance of the ventral: second dorsal commences nearly midway between the posterior extremity of the first dorsal and the base of the caudal: these two fins are of about equal size: inferior margin of caudal with a faint indication of a lobe. *Colours*—reddish-brown superiorly, becoming dull-white along the abdominal surface: iris golden, with a black edge.

Blyth observes, l. c. *Pristis antiquorum*, Latham: "Small individuals are not unfrequently brought to the Bazaar." As I could find in the Calcutta Museum only several small stuffed examples of *P. Perrotteti* without labels, and none of *P. antiquorum*, I consider Mr. Blyth to have alluded to this species. Dr. Günther remarks that "there is no possibility of distinguishing those (isolated rostra) of *Pristis antiquorum* from those of *P. Perrotteti*."

Habitat.—Tropical seas, entering rivers. In the Mahanuddee river it ascends at least forty miles from the sea, far beyond influence of the tides and salt water, where I obtained it to 4 ft. in length. In Orissa it is only eaten by the sweepers and the very lowest castes.

3. Pristis zysron, Plate CXCI, fig. 2.

Bleeker, Plagios. p. 55; Duméril, Hist. Nat. Poiss. i, p. 479; Günther, Catal. viii, p. 438.

Pristis dubius, Bleeker, Plagios. p. 56; Duméril, Hist. Nat. Poiss. i, p. 478.

? *Pristis pectinatus*, Klunz. Fische Roth. Meer. 1871, p. 673.

Vella sorrah, Tamil.

Rostrum intermediate in width between *P. cuspidatus* and *P. Perrotteti*, of about the same breadth throughout, and armed with from twenty-five to thirty-two pairs of teeth, of mostly the same number on either side: they commence just anterior to the base of the snout, the posterior ones are much further apart than the anterior ones. *Teeth*—intermediate in size between *P. cuspidatus* and *P. Perrotteti*. *Fins*—first dorsal almost entirely behind the ventrals: second dorsal, as large or larger than the first, is situated rather near to the root of the caudal to which its posterior lobe almost reaches: caudal without a lower lobe. *Colours*—sandy-brown, becoming lighter beneath.

This species is perhaps more common in the seas of India than *P. cuspidatus*. It is especially abundant along the Meckran and Sind coasts, where it is much dreaded.

Habitat.—Seas of India to the Malay Archipelago. Attaining at least 20 ft. in length. The example figured (thirty-four inches long) was from Madras.

Family, II—RHINOBATIDÆ.

The disk slightly dilated laterally: the rayed portion of the pectoral fin not continued on to the snout. Tail thickened, moderately elongated, and with a longitudinal fold along either side. Two well-developed dorsal likewise a caudal fin. No electric organs.

These fishes are very destructive amongst marine crustacea and molluscs: and are said to live in large droves. Owing to the great injury done by them to the beds of pearl oysters at Ceylon, it was proposed to enclose such with stakes to prevent their ingress.

Geographical distribution.—Tropical and temperate seas.

SYNOPSIS OF INDIAN GENERA.

1. *Rhynchobatus.* Two dorsal fins, the anterior opposite the ventrals, p. 730.
2. *Rhinobatus.* Two dorsal fins, the anterior situated far behind the ventrals, p. 731.

Genus, I—Rhynchobatus, *Müller* and *Henle*.

Rhina, sp. and *Rhinobatus*, sp. Bl. Schn.: *Rhamphobatis*, Gill.

Body depressed and elongated. Gill-openings inferior, narrow, and internal to the base of the pectoral fin. Spiracles wide and behind the eyes, which latter have no nictitating membrane: snout rather elongated and acute: nostrils inferior, oblique, wide slits. Teeth obtuse, ridged: the dentary plate having an undulated surface. Dorsal fins spineless, the first opposite the ventrals: front edge of pectoral free, not extending to the head: caudal with a well-marked lower lobe.

Geographical distribution.—From the Red Sea and East coast of Africa through the seas of India to the Malay Archipelago and China.

SYNOPSIS OF SPECIES.

1. *Rhynchobatus ancylostomus.* Snout broad, having a semi-circular outline. Rows of large tubercles and spines on head and trunk. Brown. From the East coast of Africa through seas of India to the Malay Archipelago and China.
2. *Rhynchobatus Djeddensis.* Snout elongated: few tubercles or spines on head or body. A black shoulder spots and numerous white spots on upper surface. Red Sea to the Malay Archipelago, and beyond.

1. **Rhynchobatus ancylostomus**, Plate CXCIII, fig. 3.

Rhina ancylostomus, Bl. Schn. p. 352, t. lxxii; Gray and Hardwicke, Ill. Ind. Zool.; Agassiz, Poiss. Foss. iii, p. 82, t. H. f. 3 and 4; Richards. Ich. China, p. 195; Müll. and Henle, Plagiost. p. 110; Cantor, Catal. Mal. Fish. p. 409; Bleeker, Beng. p. 80 and Plagiost. p. 56; Jerdon, M. J. L. and Sc. 1851, p. 148.
Rhina cyclostomus, Swainson, Fishes, ii, p. 322.
Rhamphobatis ancylostomus, Gill, Ann. Lyc. Nat. Hist. New York, 1861, vii, p. 408.
Rhynchobatus ancylostomus, Günther, Catal. viii, p. 440.

Manu ulava, "mud skate," or *Nalla dindi*, Tel.

Snout very broad with a semi-circular outline. It has longitudinal rows of tubercles, one on either side of the head above the eyes continued on to the shoulders, and a median one along the back, with two short lateral ones between this last and the pectoral fin: a few round the front edge of the eye and below the spiracle. *Teeth*—77/75. Twenty-two vertical rows in the centre of the upper and twenty-seven in the centre of the lower jaw. The dental surface deeply undulated, with one large median and a smaller lateral elevation in the lower jaw and with corresponding emarginations in the upper. The teeth are largest on the summit of each elevation: all are obtusely rounded with several longitudinal ridges across each. *Colours*—of a dull brown, lighter beneath: the body and sometimes the fins covered with whitish spots: occasionally some tortuous black lines.

Habitat.—From the East coast of Africa through the seas of India to the Malay Archipelago and China. The figure is taken from an example sent by Dr. Jerdon from Madras to the British Museum: its length was 6 ft. 10 in.; and inside it were found the remains of great numbers of crustacea of many kinds. The natives assert that it swims slowly just above the bottom of the sea not far from the shore, picking up what it finds.

2. **Rhynchobatus Djeddensis**, Plate CXCII, fig. 1.

Rhinobatus, Duhamel, Pesches, ii, pl. xv, figs. 1 and 2.
Raja Djiddensis, Forsk. Descr. Anim. p. 18.

Raie bokhat and *rhinobate*, Lacép. i, pp. 139, 145, t. vi, f. 3.
Rhinobatus lævis, Bl. Schn. p. 354, pl. lxxi; Swainson, Fishes, ii, p. 322; Schleg. Faun. Japon. Poiss. p. 306, pl. cxxxix.
Rhinobatus djidsensis, Bl. Schn. p. 356.
Raja, Russell, Fish. Vizag. i, p. 6, and *Walawah Tenkee*, tab. x.
Rhinobatus djeddensis, Rüpp. Atl. Fische, p. 54, tab. xiv, fig. 1; Benn. in Life of Raffles, p. 693.
Rhinobatus Duhameli, Blainv. Faun, Fr. p. 48.
Rhynchobatus lævis, Müll. and Henle, p. 111; Bleek. Plag. p. 58; Duméril, Hist. N. Poiss. i, p. 483.
Rhynchobatus djeddensis, Cant. Mal. Fish. p. 412; Jerdon, M. J. L. and Sc. 1851, p. 148; Day, Fish. Malabar, p. 273; Günther, Catal. viii, p. 441; Klunz. Fisch. Roth. Meer. 1871, p. 674.

Ulavi, or *Tipi Ulavi*, Tel.

Snout elongated, the distance between the mouth and end of snout equals 1/4 to 1/5 of the entire length excluding the caudal fin, being shortest in adults. *Eyes*—rather large: the spiracle close behind the orbit. *Teeth*—oval, wider than broad with a horizontal cusp across the centre of each: 40-42/40-42, twenty to twenty-five vertical rows across the middle of both jaws. Dental plate with a central and a smaller lateral elevation, corresponding emarginations exist in the upper jaw. *Fins*—the first dorsal commences opposite the centre of the base of the ventral. The second dorsal is half nearer to the base of the caudal than to the posterior extremity of the first dorsal; it is smaller than the latter fin; but its shape is the same. *Scales*—minute, of irregular shapes and sizes, keeled: a number of tubercles, directed backwards, exist in rows in some parts of the body: a supraorbital row extends from the anterior margin of the orbit round its upper edge to above the spiracle: a second passes from a central point between the termination of the last two and proceeds along the back to the base of the first dorsal, the tubercles on it being much further apart than in the other lines: from slightly behind the commencement of the dorsal line of spines is a short diverging row on either side, also a row on the shoulder, and two or three spines on the scapula. The lateral keel commences a little above the termination of the ventrals. *Colours*—the immature are dull-gray above, whitish sometimes tinged with red beneath. A dark or black band on the upper eyelid and a dark spot beneath on either side of the snout: also there is usually, but not invariably, a black spot at the root of the pectoral, which may have several small white ones round it. The body and sometimes the pectoral fin is spotted with whitish, or light gray. Iris golden. The adult is of a dull-gray above and lighter on the abdomen.

The young are captured along the Coromandel coast in large numbers about the month of March.

Habitat.—Red Sea and East coast of Africa, seas of India to the Malay Archipelago, and beyond. Its flesh is considered nourishing whether eaten salted or fresh, and oil from its liver is much esteemed. It grows to at least six feet in length.

Genus, 2—RHINOBATUS, sp. *Bl. Schn.*

Syrrhina, Müll. and Henle.

Body depressed and elongated. Spiracles wide and behind the eyes. Snout elongated, the cranial cartilage being produced and the interval between it and the pectoral fin being filled by a membrane. Nostrils oblique and wide: the anterior nasal valves not confluent. Teeth obtuse, ridged. Dorsal fins spineless: both far behind the ventral: no lower caudal lobe.

Geographical distribution.—Tropical and sub-tropical seas. They are exceedingly numerous along the coast of India, and prefer a sandy to a muddy bottom.

SYNOPSIS OF SPECIES.

Rhinobatus halavi. Snout rather obtuse: a few blunted spines along the middle of the back. Mediterranean, West coast of Africa, Red Sea, and seas of India to the Malay Archipelago.
Rhinobatus granulatus. Snout elongated: a row of spines along the middle of the back. Seas of India to the Malay Archipelago and Australia.
Rhinobatus Thouini. Nostrils very large, their distance apart at the base being less than 1/2 their length. Red Sea, seas of India to the Malay Archipelago.

1. Rhinobatus halavi, Plate CXCIII, fig. 4.

Raja halavi, Forsk. Desc. Anim. p. 19.
Rhinobatus halavi, Rüppell, Atl. Fische, p. 55, t. xiv, f. 2; Müller and Henle, Plagiost. p. 120; Guichen, Exp. Alger. Poiss. p. 129; Duméril, Hist. Nat. Poiss. i, p. 496; Günther, Catal. viii, p. 412; Klunz. Fische Roth. Meer. 1871, p. 675.
Rhinobatus obtusus, Müll. and Henle, p. 122. pl. xxxvii, f. 2; Bleeker, Beng. p. 82; Blyth, J. A. S. of Bengal, 1860, p. 37; Duméril, l. c. p. 493; Günther, Catal. viii, p. 443.

Snout rather obtuse, its length equalling 7 to 8 in the total. The width of the interorbital space equals $2\frac{1}{4}$ to $2\frac{1}{3}$ in the length of the snout. Anterior nasal valve not dilated laterally. The distance between the

outer angles of the nostrils equals $1\frac{1}{4}$ in the preoral length of the snout: the length of the nostrils about equals the distance their bases are asunder. Rostral ridges divergent posteriorly, becoming confluent in their anterior half or 2/3. *Teeth*—transversely oval with a slight ridge along the centre: the width of the plate above the symphysis of both jaws being 1/8 of its length: 70/66 rows of teeth: and fifteen vertical rows in the median line in either jaw. The dental plate almost straight. *Fins*—The two dorsals of about the same size, their distance asunder equalling the interspace between the second dorsal and base of the caudal: the latter being $7\frac{1}{2}$ to $8\frac{1}{2}$ in the total length. *Scales*—are somewhat trefoil-shaped and flattened, being rather largest along the median line of the back, which, however, is not spined, although a few tubercles almost form spines. *Colours*—reddish-gray superiorly, becoming white beneath: fins and snout with a reddish tinge. Large examples have occasionally black blotches over them.

Habitat.—From the Mediterranean, West coast of Africa and Cape of Good Hope: also from the Red Sea through the seas of India to the Malay Archipelago and China. It attains at least six feet in length. The example figured was from Mangalore.

2. Rhinobatus granulatus, Plate CXCII, fig. 2.

Rhinobatus rhinobatus, Bl. Schn. p. 353.
Raja, Rüssell, Fish. Vizag. p. 7, and *Suttiwarah*, pl. xi.
Rhinobatus granulatus, Cuv. Règn. Anim.; Müll. and Henle, Plagiost. p. 117, t. xxxviii; Bleeker, Beng. p. 82; Blyth, J. A. S. of Beng. 1860, p. 36; Duméril, Hist Nat. Poiss. i, p. 493; Gunther, Catal. viii, p. 443.
Rhinobatus armatus, Gray and Hardw. Ill. Ind. Zool.; Müll. and Henle, Plagiost. p. 119; Bleeker, Beng. p. 82, and Plagiost. p. 60; Duméril, l. c. p. 494.
Rhinobatus tuberculatus (Cuvier), Bleeker, Beng. p. 82.
Rhinobatus typus, Bennett, Life of Sir S. Raffles, p. 694.

Pur-run-gun, Tamil; *Cun-da-ree*, Sind.; *Gua-man-haing*, Burmese.

Snout elongate, its length being from $4\frac{1}{2}$ to $5\frac{1}{2}$ in the total, and as a rule being longest in the immature: the width of the interorbital space varies from $2\frac{1}{2}$ to $3\frac{1}{2}$ in the length of the snout. Anterior nasal valve with no lateral dilatation. The distance between the external angles of the nostrils equals about 2/3 or 3/5 in the preoral portion of the snout: the two rostral ridges narrow and closely approximating in their anterior half or two-thirds: mouth transverse. *Teeth*—42/32, dental plate with a central and lateral elevation in the lower, with corresponding depressions in the upper jaw: 20/22 vertical rows in the upper and 13 in the lower jaw opposite the symphysis. *Scales*—tubercles on the back, and a row of compressed spines along its middle, which become obsolete with age: some spines on the edge of the orbit and on the shoulder. In the young a row likewise along either side of the upper edge of rostral ridge. *Colours*—reddish-gray superiorly, becoming dull-white beneath.

Habitat.—Seas of India to the Malay Archipelago and Australia. It attains at least seven feet in length. The example figured was from Malabar.

3. Rhinobatus Thouini, Plate CXC, fig. 4.

Raie Thouin, Lacépède, i, p. 134, pl. i, f. 3-5.
Raja Thouiniana, Shaw, Zool. v, 2, p. 318, pl. cxlvii, f. 2.
Rhinobatus Thouini, Müller and Henle, Plagiost. p. 120; Duméril, Hist. Nat. Poissons, i, p. 500, pl. x, f. 2 (*snout*): Günther, Catal. viii, p. 442.
Rhinobatus ligonifer, Cantor, Catal. p. 415, pl. xiv; Bleeker, Plagiost. p. 59.

Snout of moderate extent, equalling five or six in the total length: the width of the interorbital space equals $2\frac{3}{4}$ in the length of the snout. Anterior nasal valves not dilated laterally. The distance between the outer angles of the nostrils equals 2/3 of the length of the preoral portion of the snout: the length of the nostrils is more than twice the extent their bases are apart. Mouth straight. Rostral ridges confluent in almost their entire length. *Teeth*—small, upwards of one hundred rows in either jaw. *Fins*—the two dorsals of about the same size, high and pointed, the first if laid flat nearly reaching the base of the second dorsal: caudal $6\frac{1}{2}$ in the total. *Scales*—skin granulated with a row of compressed spines along the middle of the back and smaller ones over the shoulders and above the eyes. *Colours*—brown, becoming yellowish-white beneath.

Habitat.—From the Red Sea (Duméril, l. c.) through those of India to the Malay Archipelago.

This species attains to $6\frac{1}{2}$ feet in length, according to Bleeker. The example figured is a skin $4\frac{1}{2}$ feet long from the Andamans, and the only specimen I procured in the East.

FAMILY, III—TORPEDINIDÆ.

Trunk broad and disk smooth. Anterior nasal valves confluent and forming a quadrangular flap. Tail with a rayed dorsal (except in Temera) and caudal fin: also a longitudinal fold along either side. An electric organ* situated between the pectoral fin and the head.

Geographical distribution.—Tropical, sub-tropical and temperate seas. In India they do not appear to be used as food.

SYNOPSIS OF GENERA.

1. *Narcine.* Two dorsal fins: spiracles immediately behind the eyes, p. 733.
2. *Astrape.* One dorsal fin, p. 733.

Genus, 1—NARCINE, *Henle.*

Disk distinct from the tail, which has a lateral fold on either side and is longer than the disk. Spiracles close behind the eyes: nasal valves confluent, forming a quadrangular flap. Teeth nearly flat, with a central point. Two dorsal fins, the anterior behind the ventrals and usually smaller than the posterior. An electric apparatus present.

Geographical distribution.—Tropical and sub-tropical seas.

1. Narcine timlei, Plate CXCII, fig. 3.

Raja timlei, Bl. Schn. p. 359.

Raja, Russell, Fish. Vizag. i, pp. 1 and 2, and *Temeree*, pl. i, and *Nalla Temeree*, pl. ii.

Narcine timlei, Henle, Narcine, p. 34, t. ii, f. 1; Müll. and Henle, p. 130; Bleeker, Beng. 80, and Nat. Tyds. Ned. Ind. iv, 1853, p. 512; Duméril, Rev. Zool. 1852, p. 273, and Hist. Nat. Poiss. i, p. 519; Kner, Novara Fische, p. 417; Günther, Catal. viii, p. 452.

Narcine Indica, Henle, Narcin. p. 35, pl. ii, fig. 2; Müll. and Henle, p. 130; Bleeker, Beng. p. 80; Duméril, l. c.; Cantor, Catal. Mal. Fish. p. 417; Jerdon, M. J. L and Sc. 1851, p. 148; Day, Fish. Mal. p. 276.

Narcine microphthalma, macrura and *maculata*, Duméril, Rev. Zool. 1852, pp. 274, 275, 277, and Hist. Nat. Poiss. i, p. 518.

Outline of disk somewhat rounded, while it is broader than long: along the side of the tail is a broad skinny keel reaching the base of the caudal fin. Caudal portion of fish rather longer than the body. Nasal valves confluent, forming a quadrangular skinny flap which is rather elongated in the middle. Spiracle just behind the orbit and not tuberculated on the edge. *Teeth*—flattened anteriorly, the internal ones with a small median cusp: the dental plate only embraces the central half of either jaw, the lips being thickened and continuous at the angles. The form of the dental plate varies, being either angular in the mandible the angle pointing downwards or similar to what obtains in the upper jaw. *Fins*—the anterior dorsal usually commences just behind the ventrals but occasionally over their posterior extremity, it is somewhat smaller than the posterior: in the young its apex forms an angle, which in the adult becomes rounded. The distance between the two dorsals equals that between the posterior dorsal and the caudal. The size and shape of the two dorsals is similar. Caudal with its hinder edge rounded and confluent with the inferior. *Colours*—body and fins reddish-brown above, with numerous irregularly sized chocolate-coloured spots: lower surface white. Pupil triangular, apex below. Iris golden. In the immature the spots have a white margin. Some examples are marked all over with large brown blotches much wider than the ground colours. In others no spots at all exist. These differences in colour do not depend on sex, age, or locality.

Habitat.—Seas of India and the Malay Archipelago. It attains at least eighteen inches in length. "Out of the water they may be handled with impunity."—*Cantor.*

Genus, II—ASTRAPE, *Müller* and *Henle.*

Tail with a fold on either side. Spiracles close behind the eyes, which last are minute. Nasal valves confluent, forming a large quadrangular flap. Teeth flattened or with a central elevation, the dental plate extending slightly beyond the outer edge of the jaws. A single dorsal fin on the tail: caudal well developed. An electric apparatus on the side of the head between it and the pectoral fin.

Geographical distribution.—Seas of India to the Malay Archipelago and China, also the Cape of Good Hope and Madagascar.

* For a description of the peculiar "Appareil folliculaire nerveux" of the Torpedo not possessed by other *Plagiostomata* nor by *Gymnotus* or *Malapterurus*, &c., *see* Boll. in Arch. Anat. Phys. Berl. 1875; and on the immunity of this fish from a self-inflicted shock, J. Steiner, Arch. Anat. Phys. 1874.

1. **Astrape dipterygia**, Plate CXCII, fig. 4.

Raja dipterygia, Bl. Schn. p. 359.
Torpedo dipterygia, Olfers, Torped. p. 25, tab. ii, fig. 2.
Narcine dipterygia, Henle, Narcin. p. 38.
Astrape dipterygia, Müll. and Henle, p. 131; Bleeker, Beng. p. 80; Cant. Mal. Fish, p. 419; Jerdon, M. J. L. and Sc. 1851, p. 149; Duméril, Rev. Zool. 1852, p. 281, and Hist. Nat. Poiss. p. 523; Day, Fish. Malabar, p. 276; Günther, Cat. viii, p. 454.
Astrape Japonica, Schleg. Faun. Japon. Poiss. p. 307, pl. cxl.

Disk rounded, as wide as long, extending posteriorly to over the anterior margins of the ventrals. Length of tail shorter than that of the body: a low keel along its lateral edge. Snout short. Spiracles smooth, close to and much larger than the eyes: vent slightly nearer to the head than to the posterior extremity of the caudal fin. *Teeth*—pointed with tetragonal bases; they slightly project beyond the margin of the jaws. *Fins*—ventrals with their angles acute in the young, rounded in the adult. Caudal rounded, its upper and lower portions confluent. *Colours*—Dull reddish-olive above, whitish below. A white spot near either side of the posterior end of the head, another above the end of the ventral, and generally a third at the root of the caudal: ventral with a white edge.

Habitat.—Seas of India to the Malay Archipelago, China and Japan. It attains at least ten inches in length. The one figured (life size) was from Madras.

FAMILY, IV—RAJIDÆ.

Disk broad, rhombic: tubercules or spines usually present. The pectorals extend to the snout. Tail with a longitudinal fold on either side. No serrated caudal spine. Electric organs absent.

Yarrell remarks:—"Spines on the upper surface of the males occur in the different species of Skate with smooth skins, and are entirely independent of those spinous productions of the cuticle which distinguish two British species." Darwin* observes of these spines, "they are only temporarily developed during the breeding season." This phenomenon, so far as I am aware, has not been observed amongst the various forms of Indian skates or rays.

Geographical distribution.—Seas of both hemispheres, but more numerous in the northern, it possesses but few representatives along the coasts of India.

Genus, 1—PLATYRHINA, *Müller* and *Henle*.

Disk rhombic, with a fold on either side: tail distinct. Nasal valves distinct. Two dorsal fins on the tail: caudal well developed: ventrals separated one from the other. Body covered with rough asperities and spines.

Geographical distribution.—Seas of India to China and Japan.

Platyrhina Schönleinii.

Müll. and Henle, Plagios. p. 125, t. xliv; Duméril, Hist. Nat. Poiss. i, p. 577; Günther, Catal. viii, p. 471.

Disk sub-circular: snout obtuse: tail as long as the disk. Dental plate undulating: three elevations in the lower and three corresponding depressions in the upper jaw. Nostrils wide apart. A row of strong spines and also smaller lateral ones along the median line of the back and tail: some more along the edge of the orbit and on the shoulder. *Colours*—brown, covered with light blotches, said sometimes to have dark cross bands and large dark spots.

Habitat.—Coromandel coast of India. The example described, a male, 27½ inches in length, was in the Madras Museum.

* "Descent of Man," p. 331.

Family, V—TRYGONIDÆ.

Disk wide: the pectorals are continued to the extremity of the snout where they become confluent. Tail long and slender without any lateral folds. Vertical fins, if present, imperfectly developed, or instead they may be modified into a serrated spine.

The forms with armed tails occasion exceedingly dangerous injuries, not only due to their jagged nature, but apparently also to the presence of some irritating foreign substance which becomes carried into the wound.

Geographical distribution.—Tropical and temperate seas.

SYNOPSIS OF GENERA.

1. *Urogymnus*—Tail long and spineless. Body densely covered with tubercles, p. 736.
2. *Trygon*—Tail long, armed with a serrated spine. Teeth flattened, p. 736.
3. *Tæniura*—Tail long, armed with a serrated spine, and having a broad lower cutaneous fold continued to its termination, p. 740.
4. *Pteroplatea*—Body very broad, tail very short and armed with a serrated spine. Teeth with from one to three cusps, p. 741.

Genus, 1—Urogymnus, *Müller* and *Henle.*

Anacanthus, Ehren.: *Rhachinotus*, Cantor.

Disk sub-circular: tail long and distinct, destitute of any spine, but with a narrow inferior fold: pectorals united anteriorly. Teeth flattened. Body covered with osseous tubercles, amongst which are sharp conical spines.

Geographical distribution.—From the Red Sea and East coast of Africa, throughout the seas of India to the Malay Archipelago.

Urogymnus asperrimus, Plate CXCV, fig. 1.

Raja asperrima and *? Africana*, Bl. Schn. p. 367.
Anacanthus asperrimus and *? Africana*, Müll. and Henle, Plagios. p. 157.
Rhachinotus Africanus, Cantor, Catal. Mal. Fish. p. 422; Bleeker, Nat. Tyds. Ned. Ind. 1853, iv, p. 64.
Urogymnus asperrimus, and *Africanus*, Gray, Cat. Chond. p. 115; Duméril, Hist. Nat. Poiss. i, pp. 580, 581; Günther, Catal. viii, p. 472; Klunz. Fische Roth. Meer. 1871, p. 64.

Moollan tiriki, Tam.

Disk nearly as wide as long: snout scarcely projecting. Body densely covered with small heart-shaped scales, between which are numerous thorns which are generally erect, and are continued posteriorly to the first fifth of the tail, where they cease. On the pectoral fins are numerous small conical spines, irrespective of those over the body amongst the tubercles. *Colours*—greenish above, white beneath.

A fine example, 2 feet across the disk, exists in the Madras Museum.*

Habitat.—Red Sea, East coast of Africa, seas of India to the Malay Archipelago.

Genus, 2—Trygon, *Adanson.*

Himantura, *Himitrygon* and *Hypolophus*, Müll. and Henle: *Paratrygon*, Duméril.

Disk oval or rhomboidal: tail elongated and tapering. Nasal valves coalescent, forming a quadrangular flap. Teeth flattened or with a central point or transverse ridge. Pectoral fins united anteriorly: tail destitute of a fin, or if with a cutaneous fold, such does not extend to its extremity: it is armed superiorly with one or two lanceolate spines serrated on both sides. Body smooth or with tubercles.

In this Genus the colours in individuals of the same species are subject to considerable variation, and this not entirely due to age. The character of the tubercles and their extent have also been (as I think erroneously) employed to characterize some species, thus one, *Trygon chindrakee* (Cuv.) Bleeker or *T. nuda*, Günther, is a form without tubercles or spines, except on the tail. *T. polylepis*, Bleeker, has small tubercles in the interorbital space, a narrow band along the back with a few indistinct enlarged ones, but none on the tail. *T. walga*, Müll. and Henle, has the interorbital space and back covered with small tubercles, but no larger ones in the median line, but a series of short spines between the root of the tail and the larger spine. Now all

* I must here remark that, when referring to the specimens of fish in the Madras Museum, I allude to what *were there* in 1873, as since then the Curator (under, I presume, orders from Government) has given away some of the finest examples.

these forms with every intermediate variation, occur, and the smooth body usually confined to the young may be persistent in the adult.

The various species of this extensive Genus may be sub-divided as follows:—

A.—*Dental laminæ transverse: if undulating, slightly so: no caudal cutaneous fold* (*Himantura*).

1. *Trygon uarnak*—Snout rather pointed. Tail very long. One or more large tubercles in middle of back. Brown or spotted. Red Sea, Indian Ocean to Malay Archipelago: also African coast.
2. *Trygon marginatus*—Tail twice as long as disk. A row of pointed tubercles on the back which is spined all over. Hooghly at Calcutta.
3. *Trygon Bleekeri*—Snout very pointed. Tail three to four times as long as disk. A central and several smaller tubercles on the back. Bengal.
4. *Trygon walga*—Snout pointed. Tail rather longer than disk. Tubercles variously disposed. Red Sea, seas of India to the Malay Archipelago.

B.—*Dental laminæ transverse: if undulating, slightly so. Tail with a cutaneous fold* (*Trygon*).

5. *Trygon Bennettii*—Snout pointed. Tail three times as long as disk. Tubercles few. Red Sea, seas of India to China.
6. *Trygon Kuhlii*—Tail 1/2 longer than disk. Body nearly smooth. Blue ocelli on upper surface. East coast of Africa, seas of India to the Malay Archipelago.
7. *Trygon imbricata*—Tail scarcely as long as body. Tubercles few. Seas of India.
8. *Trygon zugei*—Snout very pointed and produced. A few tubercles in median line of back. Seas of India to the Malay Archipelago, China, and Japan.

C.—*Lower dental laminæ somewhat pointed, the upper being angularly bent for its reception* (*Hypolophus*).

9. *Trygon sephen*—A broad fold along lower surface of tail. Upper part of body covered with flat tubercles. Red Sea, East coast of Africa, seas of India to the Malay Archipelago.

A.—*Dental laminæ transverse; if undulating, slightly so: no caudal cutaneous fold* (*Himantura*).

1. Trygon uarnak, Plate CXCIV, fig. 1.

Raja uarnak, Forsk. Descr. Anim. p. 18.
Trygon Russellii, Gray and Hardw. Ill. Ind. Zool.
Pastinachus uarnak, Rüpp. N. W. Fisch. p. 69, pl. xix, figs. 2*a* and 2*b*.
Trygon uarnak, Müll. and Henle, p. 158; Cant. Catal. Mal. Fish. p. 423; Richards. Ich. China, p. 197; Bleek. Plag. p. 69; Blyth, Journ. As. Soc. Beng. 1860, p. 42; Duméril. Hist. Nat. Poiss. i, p. 585; Day, Fish. Malabar, p. 277; Günther, Catal. viii, p. 473; Klunz. Fisch. Roth. Meer. 1871, p. 679.
Trygon variegatus, McClell. Calc. Journ. Nat. Hist. 1841, i, p. 60, pl. ii, fig. 2; Duméril, l. c. p. 587; Blyth, Journ. Asiat. Soc. Beng. 1860, p. 43.
Trygon uarnacoides, *undulatus*, *macrurus*, *pareh*, and *pastinacoides*, Bleek. l. c. pp. 70, 71, 72, 75, or Nat. Tyds. Ned. Ind. iii, p. 738, and v, p. 461; Duméril, l. c. pp. 586, 588, 590.
Trygon Gerrardi, Gray, Chond. p. 116; Günther, Catal. viii, p. 474 (*young*).
Trygon Ellioti, Blyth, Journ. As. Soc. Beng. 1860, p. 41.

Sona kah tiriki, Tam.: *Puli tenke*, Tel.

Disk about as broad as long, snout pointed and rather prominent: tail from three to four times as long as the body. Iris with a well-developed superior flap. *Teeth*—dental laminæ undulating. *Fins*—no cutaneous folds on the tail which is armed with a serrated spine situated about 1/2 the length of the disk from the root of the tail. *Tubercles*—vary in different specimens, absent in the very young: in those with a disk of about 6 inches across there are two or three rows of widely separated oval tubercles on either side of the head, internal to the eyes, and meeting on the occiput: from thence towards the scapula is a single row of larger and more widely separated ones. In the middle of the back three large closely approximating scales or tubercles, the centre one heart-shaped, the anterior round, and the posterior almost heart-shaped. In some specimens of a large size, there are also numerous distant thorns on the tail which may disappear with age. In specimens with a disk of 3 feet across, the head, back, and sides are covered with smooth, roundish scales, having intermediate smaller ones. *Colours*—vary according to age: up to the period when the breadth of the disk is about 9 inches the body is of a yellowish brown, darkest along the back, and the abdomen white: a short distance beyond the commencement of the tail it is irregularly annulated with alternate narrow light brown, and broad or narrow dark-brown rings. As its age increases, black spots commonly appear on the body, and when it has attained the width of 3 feet across its disk it is light brown or greenish-olive, covered with lighter and in some almost white spots, or reticulated with white lines, whilst the anterior extremity of the tail also shows the remains of the rings. The adult is uniformly brownish or greenish-olive. Iris golden. Occasionally there are light spots on the posterior portion of the disk, as shown in the figure (*T. Gerrardi*, Gray, or *T. macrurus*, Bleeker).

In the cold season, as about October, these fish are frequently perceived springing out of the water for some distance. They devour large quantities of small fish, crustacea, molluscs, &c.

Habitat.—Red Sea, seas and estuaries of India to the Malay Archipelago, and China, also the Cape of Good Hope. The immature are frequently captured in the back waters, and wounds from their caudal spines are much dreaded. In one instance, an old man was admitted into the Civil Hospital in Cochin for mortification of the arm, due to a wound inflicted by one of these fish, which he attempted to drag out of the sea into a boat: it wound its tail round his arm, and dragged its spine through the muscles nearly down to the bone. They attain a large size, as 5 feet or more across the disk.

2. Trygon marginatus.

Blyth, Journal Asiatic Soc. of Bengal, 1860, p. 38; Duméril, Hist. Nat. Poiss. i, p. 588.

? *Trygon atrocissimus*, Blyth, l. c. p. 39.

Disk slightly broader than long, tail from 1/2 longer to nearly twice as long as the disk. The width of the interorbital space equals the length of the snout. Tubercles sparsely set all over the upper surface, but a little larger along the median line, where they appear like small limpets: an irregular row of pointed tubercles on either side of the middle line of the back: tail tuberculated as far as its spine, but destitute of any fin. *Colours*—gray above; buffy-white below, with a dark border, except in front.

In all the examples examined by Blyth, the caudal spine had been removed, as is usually done by fishermen. *T. atrocissimus*, is founded on some pieces of tails of a *Trygon*, in which the spine is present; it may be that the two species are identical.

Habitat.—Hooghly at Calcutta. I examined one of the examples in which the disk was 16 inches across and 15 long; but Blyth says one specimen was 52, another 60, inches across the disk, and the tubercles were extended on to the edge of the disk and even to its under surface. This would therefore appear to be a result of age.

3. Trygon Bleekeri, Plate CXCV, fig. 3.

Blyth, Proc. Asi. Soc. of Bengal, 1860, p. 41; Duméril, Hist. Nat. Poiss. i, p. 593; Günther, Catal. viii, p. 475.

Tail from three to four times as long as the disk. Snout prolonged and pointed. Width of interorbital space equal to 1/2 or 1/3 in the length of the snout anterior to the eye. A large round tubercle in the middle of the back, and commonly three smaller triangularly disposed before it, and three similarly placed behind it. Tubercles sometimes present along the upper surface of the tail to the caudal spine, from whence, in adults, they are continued to its extremity. *Colours*—"Brown above and below, with a narrow white median longitudinal patch on the abdomen."—*Blyth.* The example figured is brown above with margins of the disk dark.

Habitat.—Bengal. Blyth observes, length of one 25 inches to base of tail, the tail 72 inches: of another 15 and 56 inches. The example figured is 8 inches across the disk.

4. Trygon walga, Plate CXCIV, fig. 3.

Raja, Russell, Fish. Vizag. i, p. 3, and *Isacurrah tenkee*, pl. iv, and *Tenkee shindraki*, pl. v.

? *Raia fluviatilis*, Ham. Buch. Fish. Ganges, p. 1.

Trygon walga, Müller and Henle, Plagios. p. 159, t. 50; Bleeker, Plagios. p. 67; Blyth, J. A. S. of Beng. 1860, p. 40; Duméril, Hist. Nat. Poiss. i, p. 589; Günther, Catal. viii, p. 475.

Pastinaca brevicauda and *dorsalis*, Swainson, Fishes, ii, p. 319.

Trygon chindrakee, (Cuv.) Bleeker, Beng. p. 9.

Trygon heterurus and *polylepis*, Bleeker, Plagios. pp. 67, 73; Duméril, Hist. Nat. Poiss. i, pp. 590, 591; Günther, Catal. viii, p. 475; Klunz. Fische Roth. Meer. 1871, p. 680.

Trygon dadong, Bleeker, Nat. Tyds. Ned. Ind. x, p. 355; Duméril, l. c. p. 591.

Trygon imbricata, Cantor, Catal. Mal. Fish. p. 425 (? Bl. Schn.): Blyth, J. A. S. of Beng. 1860, p. 40.

Trygon immunis, Bennett, Life of Sir S. Raffles, p. 694.

Disk about as broad as long, with the snout pointed and acutely projecting, more so in some examples than in others. Eyes smaller in the adult than in the young. Interorbital space concave. *Teeth*—small, having a transverse elevated ridge along each. Dental lamina undulated. *Fins*—no cutaneous folds on the tail, the length of which is rather longer than the disk. One or two (sometimes more) large serrated spines on the tail at the commencement of its second third, between this and the base of the tail exists a median line of about seven short spines. *Scales*—interorbital space, and for a varying width along the middle of the back and also on the tail exist numerous fine tubercles which usually have no larger ones, but in some examples there is one on the centre of the shoulder, in others a few more anterior to it. Neither the number, size, character, nor extent of the distribution of the tubercles and spines depends on age or sex, adults even may be without any of either. In one example (a male) the band of tubercles along the back is very narrow, a row of large ones exists in the median line of the scapular region, and four along the back of the tail. This

would be intermediate between *T. walga* and *T. polylepis*. Another example has a row of small spines all along the first third of the back of the tail, and a moderately sized rather compressed median scapular spine with six smaller ones anterior to it: a very wide band of tubercles exists along the back. One example has the smaller caudal spine very well developed, a very narrow row of tubercles along the back, and a central scapular tubercle. Another has only a few small tubercles and one central spine in the scapular region, some between the eyes, and some fine spines between the base of the tail and the two large spines. Young ones are often destitute of tubercles or armature except the caudal spines, and this immature character may be seen in some adults. *Colours*—dull gray or brown superiorly, white beneath.

Blyth observes, the males are larger than the females and have proportionately longer tails: very commonly the second caudal spine (more especially of the females) does not extend beyond the first one. Some have a small lanceolated tubercle on the centre of the dorsal surface, others two or more, even to a series of five or six along the median line. This species is so very often brought in pairs to the bazaar, a male and a female, that I cannot help suspecting that it lives in pairs, the two being commonly taken together.

Habitat.—From the Red Sea, through the seas of India to the Malay Archipelago.

B.—*Dental laminæ transverse; if undulating, usually slightly so: tail with an upper or lower cutaneous fold (Trygon).*

5. Trygon Bennettii.

Müll. and Henle, Plagios. p. 160, t. lii; Richards. Ich. China, p. 197; Duméril, Hist. Nat. Poiss. i, p. 595; Günther, Catal. viii, p. 480.

Trygon carnea, Richards. Ich. China, p, 197.

Disk about as broad as long: tail about three times as long as disk, and with a low cutaneous fold along its inferior surface. Snout somewhat pointed. Eyes are nearer together than to the end of the snout. A tubercle in the middle of the back in adults, with some flat ones around it, and which extend backwards to the caudal spine: but the young are quite smooth. *Colours*—of a pale fleshy-red which becomes almost white in parts, the tail becoming darker near its extremity.

Habitat.—Seas of India to China and beyond.

6. Trygon Kuhlii, Plate CXCIII, fig. 2.

Müller and Henle, Plagios. p. 160, pl. 50; Temm. and Schleg. Fauna Japon, Poiss. p. 308; Bleeker, Plagios. p. 73, and Beng. p. 82; Duméril, Hist. Nat. Poiss. i, p. 603; Günther, Catal. viii, p. 479.

Disk broader than long: tail about one-half longer than the disk. Snout somewhat obtuse, its length equal to or slightly exceeding the breadth of the interorbital space. Two appendages on the floor of the mouth. *Teeth*—dental plate more undulated in the upper than in the lower jaw. *Fins*—a cutaneous fold along the tail both above and below, caudal spine well developed. *Colours*—superiorly of a dull brown, covered with numerous small black spots and larger rounded blue ocelli, each having a rather dark outer edge.

Habitat.—East coast of Africa, seas of India to the Malay Archipelago. A very good coloured illustration (a male) exists amongst Sir Walter Elliot's drawings of Madras fish, 5½ inches across the disk: it was termed *Kunnoo tirike* and *Shemen tenkee*, Tel. The example figured is 5 inches across the disk, and was obtained in Madras.

7. Trygon imbricata.

Raja imbricata, Bl. Schn. p. 366.

Trygon imbricata, Müll. and Henle, Plagios. p. 164; Duméril, Hist. Nat. Poiss. i, p. 606; Günther, Catal. viii, p. 481.

Disk as broad as long, snout produced and pointed: tail scarcely as long as the body, with low upper and inferior cutaneous folds. Small tubercles on the nape and back, with a row of conical spines along the shoulder and back: while along the tail as far as the spine are large tubercles intermixed with smaller ones.

This is said to be Bl. Schneider's *imbricata*, which has been referred by Cantor to *T. walga*, from which it appears to differ in possessing a low cutaneous fold both along the upper and lower border of the tail.

Habitat.—Coromandel coast of India.

8. Trygon zugei, Plate CXC, fig. 3.

Müll. and Henle, Plagios. p. 165, t. liii; Temm. and Schleg. Fauna Japon, Poiss. p. 309; Richards, Ich. China, p. 197; Cantor, Catal. Mal. Fish. p. 426; Bleeker, Plagios. p. 68, and Beng. p. 32; Duméril, Hist. Nat. Poiss. i, p. 606; Günther, Catal. viii, p. 481.

Trygon Crozieri, Blyth, J. A. S. of Beng. 1860, p. 45; Duméril, l. c. p. 597.

Chumbara kah, Tam.

Disk about as broad as long, with the snout very much produced and acutely pointed, its length being about 1/3 of that of the disk: tail equal to 1½ or twice the length of the disk. Eyes small: interorbital space concave. *Teeth*—dental laminæ undulated. *Fins*—a distinct cutaneous fold along the lower surface of the

tail, commencing opposite the base of the spine, there is likewise a fold along the upper surface of the tail. A strong and long spine, serrated in its last third, situated in about the commencement of the second quarter of the tail, and anterior to it a row of small spines, the body otherwise smooth. In some examples a row of tubercles exists along the median line of the back. *Colours*—dull brown superiorly, the edge of the fins black.

Habitat.—From the seas of India to the Malay Archipelago, and Japan. The example figured (7 inches across the disk) is a male from Madras.

C.—*Lower dental laminæ somewhat pointed, the upper being angularly bent for its reception* (*Hypolophus*).

9. Trygon sephen, Plate CXCV, fig. 2.

Raja sephen, Forsk. Descr. An. p. 17; Gm. Linn. i, p. 1508; Lacép. i, p. 123; Bl. Schn. p. 364.

Raja, Russell, Fish. Vizag. i, p. 2, and *Wolga tenkee*, pl. iii.

Trygon sephen, Cuv. Règn. An.; Rüpp. Atl. Fisch. p. 52, and N. W. Fische, p. 69; Günther, Catal. viii, p. 482; Klunz. Fisch. Roth. Meer. 1871, p. 680.

Raja sancur, Ham. Buch. Fish. Ganges, p. 2.

Trygon Forskalii, Rüpp. Atl. Fische, p. 53, taf. 13, fig. 2.

Hypolophus sephen, Müll. and Henle, p. 170; Bleek. Beng. p. 82, and Plag. p. 77; Cant. Mal. Fish. p. 429; Blyth, J. A. S. of Beng. 1860, p. 37; Duméril, Hist. Nat. Poiss. i, p. 616; Day, Fish. Malabar, p. 279.

Adavalan tiriki, Tamil: *Volugiri tenkee*, Tel.

Disk rather broader than long: the length of the tail three to four times that of the body. Snout more obtuse in adults. *Teeth*—lower dental laminæ somewhat pointed, the upper angularly bent for its reception: $\frac{33}{25}$ rows transversely, and $\frac{20}{25}$ vertically opposite the symphysis, they are all flattened, those in the centre of the upper jaw being the smallest. *Fins*—tail with a broad lower cutaneous fold: there may be one or two serrated spines situated rather behind its anterior third. *Scales*—upper surface of the head and body and base of tail covered by thick, concave, or flat-headed, several-sided tubercles. In the scapular region and central line of the back are two in the young, and three in the adult, of large, smooth, approximating tubercles, the middle and largest of which is usually oval, the second in size posterior and heart-shaped, the anterior or smallest round or heart-shaped. *Colours*—the upper surface of the immature is reddish-brown: but in the adult lead-coloured, becoming black in the posterior two-thirds of the tail. Some examples have a row of black blotches near their outer margin.

Habitat.—Red Sea, through the seas of India to the Malay Archipelago, and beyond. This fish grows to a large size. The jaws in the figure were from an example 5 ft. 10 in. across the disk. In its stomach were found crustacea, molluscs, &c. It is most common during the south-west monsoon, when it approaches the shore. From the skin of its back some of the "shagreen" of commerce used to be prepared. Wounds inflicted by the spine of its tail are considered dangerous.

Genus, 3—Tæniura, *Müller* and *Henle*.

Disk oval or rhomboidal: tail elongated and tapering. Nasal valves coalescent, forming a quadrangular flap. Pectoral fins united anteriorly: tail with a broad lower cutaneous fold continued to its extremity. Body and tail either smooth or furnished with tubercles.

Geographical distribution.—From the Red Sea and East coast of Africa through the seas of India to the Malay Archipelago and tropical America.

1. Tæniura melanospilos.

Bleeker, Nat. Tyds. Ned. Ind. 1853, iv, p. 513; Duméril, Hist. Nat. Poiss. i, p. 620; Günther, Catal. viii, p. 484.

Jilugu tirike, Tel.

Disk rather broader than long: its upper surface smooth. Tail very thick at its base with two strong flattened elongated spines (upper 9½, lower 5½ inches long) serrated externally. From opposite these spines on the lower surface of the tail commences a broad, cutaneous fold, and which is continued to the extremity of the tail, and on its surface are numerous tubercles of the same character as on the tail. The figure appears to have been mislaid and the colours are not noted.

The foregoing description is compiled from Sir W. Elliot's and Dr. Jerdon's notes of two examples captured in 1853 off the Coromandel coast, where they were said by the fishermen to be very rare. The tail of one with the spines intact has been preserved. One of the examples had its disk 4 ft. 11 in. long and 5 ft. 11 in. broad, its tail, however, was absent: the other was 8 ft. 11 in. in its total length, and its disk 4 ft. 1 in. long by 5 ft. 11 in. wide. Inside its stomach were found the remains of some small crabs and a squilla. It is, however, expressly stated that the body was smooth, but the tail covered with rough tubercles, all of which have a stellated base.

Habitat.—Coromandel coast of India and Batavia.

Genus, 4—PTEROPLATEA, *Müll.* and *Henle.*

Ætoplatea, Müll. and Henle.

Body at least twice as broad as long: tail thin, generally shorter than the body, with or without a rudimentary fin, but having a serrated spine: spiracles with or without a tentacle: nasal valves confluent, and forming a quadrangular flap. No papilla at bottom of the mouth. Teeth with from one to three cusps. Pectoral fins united in front. Skin smooth or tubercular.

Geographical distribution.—Tropical and temperate seas.

A.—*Tail finless.*

Pteroplatea micrura, Plate CXCIV, fig. 2.

Raja micrura, Bl. Schn. p. 360.
Raja pœcilura, Shaw, Gen. Zool. v, 2, p. 291.
Raja, Russell, Fish. Vizag. i, p. 4, and *Tenkee kunsul*, pl. vi.
Pastinaca kunsul, Cuvier, Règn. Anim.
Trygon pœcilurus, Bennett, Life of Sir S. Raffles, p. 694.
Pastinaca annulata, Swainson, Fishes, ii, p. 319.
Pteroplatea micrura, Müll. and Henle, Plagios. p. 169; Richards. Ich. China, p. 197; Cantor, Catal. Mal. Fish. p. 427; Bleeker, Plagios. p. 76, and Beng. p. 82; Duméril, Hist. Nat. Poiss. i, p. 613; Day, Fish. Mal. p. 278; Günther, Catal. viii, p. 487.
Pteroplatea annulata, Swainson, Fishes, ii, p. 319.
Dasyatis microura, Blyth, J. A. S. of Beng. 1860, p. 37.

Peroom tiriki, Tamil.: *Tappu cooti*, Tel.

Disk about twice as wide as long: tail as long as disk in young, but shorter in adults. No tentacle to spiracle. *Teeth*—with a single pointed cusp. *Fins*—one or two small spines on caudal fin. Skin smooth. *Colours*—Reddish-brown: tail annulated with white and brown: superiorly in the centre of each light ring, there is generally a brown spot. The young are covered all over with small brown spots. A figure exists amongst Sir Walter Elliot's drawings of Madras fish of an example covered all over with light round spots.

Habitat.—Seas of India to the Malay Archipelago, and beyond. Jerdon obtained one in which the disk was 6 feet across and 3 feet long.

FAMILY, VI—MYLIOBATIDÆ.

Pectoral fins large, developed along the sides of the body occasioning the latter to appear very broad: these fins are not present on the sides of the head, but re-appear at the end of the snout as a pair of detached fins.

SYNOPSIS OF GENERA.

A.—*Teeth large, flattened, tessellated.*

1. *Myliobatis.* Fins on head meet in the form of a soft appendage in front of snout. Teeth in several series, the middle ones being the broadest, p. 742.
2. *Ætobatis.* With only one series of very broad teeth, p. 743.
3. *Rhinoptera.* Fins on either side of snout form a lobe, p. 743.

B.—*Teeth small: cephalic fins forming an appendage on either side of snout.*

4. *Dicerobatis.* Teeth in both jaws, p. 744.
5. *Ceratoptera.* Teeth only in the lower jaw, p. 745.

A.—*Teeth large, flattened, tessellated.*

Genus, 1—MYLIOBATIS, *Cuvier.*

Head distinct from disk: snout with a soft prolongation, internally supported by fin rays: nasal valves coalescent, forming a quadrangular flap. Teeth hexagonal, flat, the central ones being broader than long: the external rows narrow. Tail very long and whip-like, having a dorsal fin near its base, and usually a serrated spine posterior to it. Body smooth or tuberculated superiorly.

Geographical distribution.—Tropical and temperate seas.

SYNOPSIS OF SPECIES.

1. *Myliobatus Nieuhofii.* Body smooth. No caudal spine. The young with five blue cross-bands on the upper surface, but which disappear with age. Seas of India to the Malay Archipelago, and Japan.
2. *Myliobatis maculata.* A row of small tubercles in the median line of the scapular region. No caudal spine. Ocelli with brown margins in posterior half of the upper surface of disk.

1. Myliobatis Nieuhofii.

Raja Nieuhofii, Bl. Schn. p. 364.
Raja, Russell, Fish. Vizag. i, p. 6, and *Mookarah tenkee*, pl. vii.
Raja fasciata, Shaw, General Zool. v. 2, p. 286, pl. cxliii.
Myliobatis Nieuhofii, Cuv. Règn. Anim.; Müll. and Henle, Plagiost. p. 177; Richards. Ich. China, p. 198; Cantor, Catal. Mal. Fish. p. 432; Bleeker, Plagiost. p. 85, and Beng. p. 82; Jerdon, M. J. L. & Sc. 1851, p. 149; Kner, Novar. Fische, p. 421; Duméril, Hist. Nat. Poiss. i, p. 638; Günther, Catal. viii, p. 491.

Tuppa koollee or *Chuppa tirike*, Tamil.

Disk about twice as broad as long: tail about three times as long as disk. Fleshy prolongation of snout short; no horn on orbit. Body smooth. *Fins*—dorsal situated at commencement of base of tail, opposite the end of the insertion of the ventrals: no spines posterior to it. *Colours*—olive superiorly, tinged externally with a reddish hue and a dark outer margin to the disk. The young have about seven blue bands across the disk and two more between or close to the eyes. As the fish increases in size, first the bands on the head disappear and finally those on the body.

Habitat.—Seas of India to the Malay Archipelago and Japan. Two good illustrations of this species, from Madras, exist amongst Sir Walter Elliot's drawings.

2. Myliobatis maculata.

Gray and Hardw. Illust. Indian, Zool.; Müller and Henle, Plagios. p. 178; Bleeker, Plagios. p. 84, and Beng. p. 82; Richards. Ich. China, p. 198; Gray, Catal. Chond. Fish. p. 129; Duméril, Hist. Nat. Poiss. i, p. 639; Günther, Catal. viii, p. 490.

Disk about twice as wide as long: tail more than three times as long as the disk. Fleshy prolongation of snout short, no horn on orbit. Body with a row of small tubercles along the median line of the back in the scapular region. *Fins*—dorsal situated at the commencement of the base of the tail, behind the end of the insertion of the ventrals: no spine posterior to it. *Colours*—greenish-brown, with round blue spots in the posterior half of the disk. Tail white with black rings.

Habitat.—Seas of India to the Malay Archipelago.

Genus, 2—ÆTOBATIS, *Müll.* and *Henle.*

Stoasodon, Cantor.

Head distinct from disk: snout with a soft prolongation, internally supported by fin rays. Nasal valves usually distinct, each forming a long flap, or such may be united into one quadrangular flap. Teeth hexagonal, broad, flat, with the lower dental laminæ projecting beyond the upper. Tail very long and whip-like: dorsal fin present near its base, and a serrated spine posterior to it.

Geographical distribution.—Seas of the tropics.

Ætobatis narinari, Plate CXCIV, fig. 4.

Narinari, Marcgr. pp. 175, 176; Willughby, p. 66, tab. c. i, fig. 5.
Raja narinari, Euphrasen, Vet. Ak. Nya Handl. 1790, xi, p. 217; Bl. Schn. p. 361.
Raja flagellum, Bl. Schn. p. 361, tab. lxxiii.
Raja, Russell, Fish. Vizag. i, p. 5, and *Eel tenkee*, pl. viii.
Raja guttata, Shaw, Gen. Zool. v, 2, p. 285, pl. 142.
Myliobatis narinari, Cuv. Règne. An.; Benn. in Life of Raffles, p. 694; Agass. Poiss. Foss. iii, pl. D.
Ætobatis Indica, Swainson, Fishes, ii, p. 321.
Raja quinqueaculeata, Quoy and Gaim. Voy. Uran. p. 200, pl. xliii, fig. 3.
Aëtobatis narinari, Müll. and Henle, p. 179; Bleek. Plag. p. 87, and Beng. p. 82; Duméril, Hist. N. Poiss. i, p. 641; Day, Fish. Malabar, p. 280; Günther, Catal. viii, p. 492; Klunz. F. Roth. Meer, 1871, p. 685.
Aëtobatis flagellum, Müll. and Henle, p. 180; Richards. Ich. China, p. 198; Blyth, Journ. As. Soc. Beng. 1860, p. 37; Duméril, l. c. p. 642.
Myliobatis eeltenkee, Rüpp. N. W. Fisch, p. 70, tab. 19, fig. 3 (*teeth*).
Goniobatis flagellum, Agass. Proc. Bost. Soc. Nat. Hist. vi, p. 385.
Goniobatis macroptera, McClell. Calc. Journ. Nat. Hist. 1841, i, p. 60, pl. 2, fig. 1.
Stoasodon narinari, Cant. Mal. Fish. p. 434; Jerdon, M. J. L. and Sc. 1851, p. 149.
Aëtobatis latirostris, Duméril, Arch. Mus. x, p. 242, pl. 20, or Hist. Nat. Poiss. i, p. 643; Günther, Trans. Zool. Soc. 1868, p. 491.
Aëtobatis laticeps, Gill, Ann. Lyc. Nat. Hist. New York, viii, p. 137.

Eel-tenkee, Tel.: *Currooway tiriki*, Tam.: *Ra-ta-charm-dah*, Andam.

The comparative proportions of this fish vary greatly with age: the distance from the mouth to the anus equals about half the width of the disk. Nasal valves in some examples separate, each forming a long flap,* in other examples the valves unite and forming a quadrangular flap the lower edge of which is fringed: the spiracle wider than orbit. *Teeth*—broad, flat, and in a single row, those in the lower jaw may be angularly bent or nearly straight: the lower dental plate projects beyond that in the upper jaw. *Fins*—the dorsal arises opposite the base or centre of the ventral, the latter fin being about three times as long as broad. Tail three or four times as long as the body, triangular in shape as far as the spine, which is serrated and situated just behind the termination of the dorsal fin: beyond the spine the tail is compressed; in this, as well as in some other species there is occasionally a second spine on the caudal a little behind the root of the first. *Scales*—body smooth. *Colours*—grayish-olive, sometimes greenish-olive or leaden-gray above, and usually covered from beyond the occiput with numerous dirty-white or bluish spots edged with black: abdominal surface white: tail black. Iris golden-green, teeth greenish-yellow. In the immature the back is of a deep leaden colour, and the spots hardly apparent.

Habitat.—Red Sea, seas and estuaries of India to the Malay Archipelago, and beyond. Eaten by the natives. Is captured to upwards of 6 feet in width.

Genus, 3—RHINOPTERA, *Kuhl.*

Mylorina and *Micromesus*, Gill.

Head distinct from the disk, but with a pair of rayed appendages on the lower edge of the snout. Nasal valves confluent, forming a broad flap. Teeth broad, flat, in five or more rows, the central ones being the broadest. Tail whip-like, with a dorsal fin and a serrated spine posterior to it.

Geographical distribution.—Tropical and contiguous seas.

SYNOPSIS OF SPECIES.

1. *Rhinoptera adspersa.* Nine series of teeth in upper jaw, and seven in the lower. Seas of India.
2. *Rhinoptera Javanica.* Seven rows of teeth in each jaw, the three central series being much the longest. Seas of India to the Malay Archipelago.

* The protruding angular portion of the dental laminæ of the lower jaw appears liable to be broken off, and it is in such examples that it seems that the notch in the united nasal valves is wanting.

1. Rhinoptera adspersa.

Müll. and Henle, Plagios. p. 183; Bleeker, Beng. p. 82; Jerdon, M. J. L. and Sc. 1851, p. 149; Duméril, Hist. Nat. Poiss. i, p. 648; Günther, Catal. viii, p. 494.

Mutta tirke, Tamil.

Disk about twice as wide as long: tail about three times as long as disk. Notch on snout shallow. *Teeth*—nine rows in the upper and seven in the lower jaw, the teeth in the central row of the upper jaw $2\frac{1}{2}$ to three times wider than in the antero-posterior direction, but not so wide as those in the next row. *Fins*—dorsal situated at the base of the tail, and immediately behind it a strong serrated spine. Upper surface of body covered with fine stellate tubercles. *Colours*—greenish brown superiorly, becoming lighter at the edges of the disk.

Amongst Sir Walter Elliot's illustrations of Madras fish are two of this species, the largest being 9 inches across the disk.

Habitat.—Seas of India.

2. Rhinoptera Javanica, Plate CXCV, fig. 4 (*teeth*).

Müller and Henle, Plagiost. p. 182, t. lviii; Bleeker, Plagiost. p. 89; Duméril, Hist. Nat. Poiss. i, p. 647; Günther, Catal. viii, p. 494.

Rhinoptera affinis, Bleeker, Nat. Verp. Holl. Maatsch. Wet. Haarlem, 1863, Guinee, p. 19.

Disk from about $1\frac{2}{3}$ to twice as broad as long: tail nearly twice as long as disk. Notch on snout shallow. *Teeth*—seven rows in either jaws, those in the central row being four or five times wider than in the antero-posterior direction, and rather more than twice as wide as the row on either side. The outer rows are hexagonal and narrow. Those in the lower jaw rather narrower than those in the upper. *Fins*—dorsal, situated at the base of the tail, and immediately behind it a serrated spine. *Colours*—greenish superiorly, white beneath.

The teeth figured are from a large example captured at Kurrachee.

Habitat.—Seas of India to the Malay Archipelago.

B.—*Teeth small: cephalic fins forming an appendage on either side of snout.*

Genus, 4—DICEROBATIS, *Blainville.*

Cephaloptera and *Mobula*, A. Duméril.

Pectoral fin not extended on to the sides of the head, which latter is truncated in front, whilst on either side is a forwardly-pointing horn-like projection, which is internally supported by fin rays. Nostrils not confluent. Teeth in jaws very small, flat, or tuberculated, and in many rows. Tail whip-like, with a dorsal fin situated above and between the ventrals, armed with or destitute of a serrated spine.

The designation *Sea-devils*, has been given by some authors to fishes belonging to this and the succeeding Genus: it is also frequently applied to several other forms of armed Rays, and fishes which inflict dangerous wounds.

Geographical distribution.—Tropical and temperate seas.

SYNOPSIS OF SPECIES.

1. *Dicerobatis eregoodoo.* Teeth numerous in both jaws. Seas of India to the Malay Archipelago.
2. *Dicerobatis Kuhlii.* Teeth $\frac{34-38}{34-38}$. East coast of Africa, seas of India to the Malay Archipelago.

1. Dicerobatis eregoodoo, Plate CXCIII, fig. 1.

Raja, Russell, Fish. Vizag. i, p. 5, and *Eregoodoo tenkee*, pl. ix.

Cephaloptera eregoodo-tenkee, Cuvier, Règne Anim.

Dicerobatis eregoodoo, Bleeker, Beng. p. 82; Cantor, Catal. Mal. Fish, p. 438; Jerdon, M. J. L. & Sc., 1851, p. 149; Günther, Catal. viii, p. 497.

Cephaloptera eregoodoo, Duméril, Hist. Nat. Poiss. i, p. 655.

Disk about twice as broad as long: tail in the young $1\frac{1}{2}$ times the length of the body, but in adults only a little more than 1/2 the same length. Body smooth. The horns or cephalic portion of the pectoral fin have a convoluted appearance, and "are used by the animal to draw its prey into its mouth, which opens like a huge cavern between them. The fishermen say they see them swimming slowly along, with their mouth open and flapping these great sails inwards, drawing in the smaller crustacea on which it feeds" (Sir W. Elliot, MS.). *Teeth*—small, like flattened, quadrangular tubercles as broad as wide in adults, twice as broad in the young, with a backwardly directed point: $\frac{340}{360}$, in a jaw twelve inches across the gape taken from an example upwards of eighteen feet across the disk, and $\frac{23}{28}$ vertical rows opposite the symphysis. In a pair of jaws, from an example captured at Kurrachee, four inches across the jaws there are $\frac{240}{244}$. Cantor found in an example thirty

inches across the disk $\frac{80}{95}$, and six or seven vertical rows. It may therefore be supposed that the number increases with age, and perhaps alters in shape. The band of teeth reach nearly to the angle of the mouth. *Fins*—no spine on the tail posterior to the dorsal fin. *Colours*—of a deep purplish superiorly: white beneath.

Amongst Sir Walter Elliot's notes on these fishes is an account of a large female example of this species, 16 ft. 9 in. across the disk, which at first broke the net but was eventually captured, Oct. 8th, 1850; subsequently, May 12th, 1853, a male was taken near the same place 18 ft. 8 in. across the disk. It is observed that only the stump of a tail remained in the female, this appendage being very liable to injury and seldom found perfect in adults.

Habitat.—Seas of India to the Malay Archipelago: attaining to 18 feet and upwards across the disk. The example is figured from Jerdon's specimen in the British Museum, 34 inches across the disk.

2. Dicerobatus Kuhlii.

Cephaloptera Kuhlii, Müller and Henle, p. 185, t. lix, f. 1; Bleeker, Amboina, p. 6, and Beng. p. 82; Duméril, Hist. Nat. Poiss. i, p. 654.

Dicerobatis Kuhlii, Günther, Catal. viii, p. 497.

Disk more than twice as wide as long: tail not so long as the disk. Body and tail smooth. *Teeth*—wider than broad: $\frac{34-38}{34-38}$ series, the band ceasing some distance from the angle of the mouth. *Colours*—brown or greenish.

Habitat.—From the East coast of Africa through the seas of India to the Malay Archipelago.

Genus, 5—Ceratoptera, *Müller* and *Henle*.

Head truncated anteriorly, free from the pectoral fin, a portion of which latter, however, exists in the form of a horn-like appendage on either side of the head. Mouth wide and anterior. Teeth small and only in the lower jaw. Tail elongated and slender, with a dorsal fin situated on its base, but without any spine.

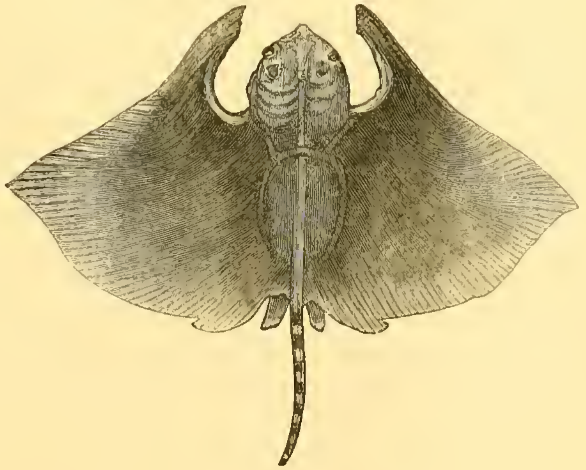
Habitat.—Tropical and temperate seas.

Ceratoptera Ehrenbergii.

Müller and Henle, Plagiost. p. 187; Günther, Catal. viii, p. 498.

Kotuwa tirike, Tamil.

Amongst Sir Walter Elliot's figures of Madras fish is one of which the woodcut is a reduced copy. The original is 6 in. across the disk, and is termed *Cephaloptera*, and the Tamil name is also given. I can only surmise that it is this species and identical with the unpublished plate of the "Symbolæ Physicæ" adverted to in the British Museum Catalogue, named *Cephaloptera stelligera*, and in which the horns are bent horizontally inwards.



ADDENDA AND CORRIGENDA.

Page 1, 20 lines from top, *for* "and thoracic" *read* "or thoracic."

Page 1, last line, *for* "*Trachinidæ*" *read* "*Ophiocephalidæ*."

Page 2, Serranus Waandersi is not identical with Bleeker's species, which I have had the opportunity of examining. Bleeker has renamed it *Epinephelus Dayi*, Atl. Ich. viii, p. 47, but that name having been previously given to another species by the same author, I propose the term Serranus Coromandelicus.

Page 13, Serranus merra. Bleeker considered some confusion must have occured in Bloch's collection, and that he mixed up two species, and therefore this form had better still be termed *S. Gilberti.*

Page 14, Serranus hexagonatus, *add* to synonyms "*Serranus stellans*, Richardson, An. Nat. Hist. 1842, ix, p. 23."

Page 17, Serranus diacanthus, *add* to synonyms "*Epinephelus Dayi*, Bleeker, Rev. Ep. p. 105."

Page 27, line 1, *for* "*Labrus punctatus*" *read* "*Labrus punctulatus*."

Page 27, line 25, *for* "Genus, 5—*Anthias*" *read* "*Aprion*," omit synonyms, while it should be placed at p. 93.

Page 27, line 29, *after* "*Preopercle*" *insert* "*entire with a single ridge or finely*."

Page 27, line 31, *for* "*from nine to eleven*" *read* "*ten to eleven*."

Page 27, line 38, *for* "Anthias multidens" *read* "Aprion multidens." The species closely resembles *A. pristipoma*, Bleeker.

Page 32, line 1, Lutianus erythropterus. I think the late Dr. Bleeker may be right when suggesting that some error may have occurred amongst Bloch's type specimens, and this fish should be *Lutianus annularis*.

Page 48, *add* Priacanthus holocentrum.

Bleeker, Perc. p. 48; Günther, Catal. i, p. 220.

B. vi, D. $\frac{10}{12\ 13}$, P. 17, V. 1/5, A. $\frac{3}{12-13}$, C. 16, L. l. $\frac{65}{\frac{55}{65}}$, L. tr. 10/36.

Length of head $3\frac{1}{3}$, of caudal fin $6\frac{3}{4}$, height of body $3\frac{1}{3}$ in the total length. *Eyes*—diameter $2\frac{1}{2}$ in the length of the head, 1/2 a diameter from the end of snout, and about 2/3 of a diameter apart. The maxilla reaches posteriorly to beneath the first third of the orbit. Preorbital and first suborbital bones serrated inferiorly: both limbs of the preopercle serrated, and also possessing a long, flat spine at its angle equal in length to more than 1/2 a diameter of the orbit. Two opercular spines. Subopercle serrated. A shoulder spine. *Fins*—dorsal spines of moderate strength, roughened on one side, the second 2/3 the height of the last, which is the longest, and equal to $1\frac{1}{3}$ diameters of the orbit: rayed portion of the fin rather higher and angular. Pectoral nearly 1/2 as long as the head. Ventral just reaches the commencement of the anal. Third anal spine the longest, the two first being serrated anteriorly, while the rays are also rugose. Caudal truncated. Free portion of the tail as high at its base as it is long. *Scales*—smallest on the head and above the lateral-line, they extend superiorly as far as the snout. *Colours*—rose-coloured superiorly, becoming nearly white on the sides and beneath: ventral fins spotted with brown: a dark edge to dorsal and anal fins.

Habitat.—Madras to the Malay Archipelago. Amongst Sir W. Elliot's illustrations of Coromandel fish exists this species; but I did not obtain examples until lately, when Dr. Keess, of Madras, sent me several.

Page 51, *add* to synonyms of Ambassis ranga "*Chanda* (*Ambassis*) *ruconius*, McClelland, Cal. Journ. Nat. Hist. ii, p. 586."

Page 55, *add* Ambassis thermalis.

Cuv. and Val. iii, p. 493; Günther, Catal. i, p. 225.

D. 7 | $\frac{1}{9}$, V. 1/5, A. $\frac{3}{9}$.

Height of body not quite 1/3 of the total length excluding the caudal fin. *Scales*—large. *Colours*—greenish, with a silvery lateral band. A blackish longitudinal streak along each caudal lobe.

Habitat.—Warm springs of Cannia, in Ceylon.

Page 59, "Apogon endekatænia" *unite* as one species with "Apogon fasciatus," p. 60.

Page 65, *Note*, "Apogon quinquevittatus=Glyphisodon rahti;" Blyth, J. A. S. of Beng. 1860, p. 111.

Page 73, "Pristipoma hasta," *add* to synonyms "*Pristipoma nageb*, Rüppell, N. W. Fische, p. 124, t. xxx, f. 2."

* When I commenced this work it was not my intention to have given references to wherever each species was adverted to by different naturalists, but to restrict such to those who have published well-known treatises on ichthyology, or might more strictly be termed Indian authors. After the *Serrani* had been printed, the late Dr. Bleeker persuaded me to give a fuller list of references, pointing out for one reason as that I had omitted *S. stellans* from my list of synonyms of *S. hexagonatus*, it had appeared to him that I believed such to be different species. Acting on his advice, I propose here adding the more important synonyms which are not recorded in the text.

Page 78, Diagramma lineatum. The two varieties especially alluded to are species. The form described is, *albovittatum.* The *lineatum* has D. $\frac{12-13}{18-20}$, L. l. $\frac{90-100}{70-90}$, L. tr. 13/27. To the colours given *add,* "base of pectoral and anal sometimes with dark blotches."

Page 83, Diagramma punctatum. Since the article on this fish was published the late Dr. Bleeker showed me his entire series, and how *D. pictum* is the young of *D. punctatum.*

Page 96, at line 13 from the bottom, *after* "*Inferior pharyngeal bones firmly united by a suture*" *add* "*in some but not in all species.*"

Page 98, *Gerres setifer, to* "*Habitat*" *add* "the sea at Madras," as I have received a specimen from that locality collected by Dr. Keess.

Page 101, 13 lines from bottom, *for* "*tæniatus*" *read* "*multitæniatus.*"

Page 105, to synonyms of "*Chætodon Mertensii*" *add* "*C. chrysurus,* Desjardin, 3rd Report of Soc. Hist. Nat. de Maurice. *C. xanthurus,* Bleeker, Amboina, p. 53."

Page 106, *under* "*Chætodon guttatissimus*" *insert* "*C. miliaris,* Quoy and Gaim. Uranie, Zool. 1824, p. 380, pl. lxii, f. 6; Cuv. and Val. vii, p. 26; Voy. Bonite, Poiss. p. 163, t. ii, f. 2; Günther, Catal. ii, p. 31, and Proc. Zool. Soc. 1871, p. 658.

Page 107, *under* "*Chætodon vittatus*" *insert,* as a synonym, "*C. Layardi,* Blyth, Kelaart's Fauna Zeylon. Appendix." The type of which, 3 inches long, is in the Calcutta Museum.

Page 148, *for* "Genus, 1—Sebastes, *Cuv. and Val.*" *insert* "Myriodon, *Barneville;*" *for* "*no groove on occiput, usually a few small spines: preopercle armed,*" *insert* "*Opercle spinate: preopercle denticulated, with spinous teeth on the lower limb directed forward.*"

For Sebastes Stoliczkæ *read* Myriodon Waigiensis.

Scorpæna waigiensis, Quoy and Gaim. Voy. Freyc. Zool. p. 324, pl. lviii, f. 1.
Centropistes scorpænoides, Cuv. and Val. iii, p. 48.
Myriodon scorpænoides, Bris. de Barnv. Rev. Zool. 1847, p. 130.

Its range extends to the Malay Archipelago and Australia.

Page 148, 7 lines from bottom of page, *erase* "*Scorpæna cyanostigma,* Bleeker, which has only eight rows of scales above the lateral-line."

Page 149, *for* "Scorpæna haplodactylus" *insert* "Scorpæna Bleekeri," and *erase* the synonyms. Bleeker observed, *S. haplodactylus* has the upper as well as the lower pectoral rays simple.

Page 152, *under* "Genus *Pterois*" *add* synonym "*Pseudomonopterus,* Klein."

Page 158, *under* "Genus *Micropus,*" *add* synonym "*Trachidermis,* Heckel."

Page 237, *above* "Genus Psenes" *insert* "Family nomeidæ."

Page 242, 8 lines from bottom, *for* "mars" *read* "marks."

Page 251. *Scomber loo,* Cuv. and Val. is not identical with *S. microlepidotus.* Dr. Bleeker gave me an example of the former from the Malay Archipelago. It may be distinguished by the anterior portion of the adipose lid of the eye passing downwards, and becoming attached to the upper edge of the preorbital and to that of the succeeding bone of the suborbital ring.

Page 255. *Caranx nigripinnis.* Two examples have lately been received from Madras, each having D. 7 | $\frac{1}{28}$, A. 2 | $\frac{1}{22}$.

Page 260, *under* "Genus *Uranoscopus*" *insert* as a synonym, "*Nematagnus,* Gill."

Page 264, *under* "*Sillago domina*" *place* "*Cheilodipterus panijus,* Ham. Buch. Fish. Ganges, pp. 57, 367.

Page 286, *under* "*Gobius viridipunctatus*" *add* synonym "*Gobius chlorostigma,* Bleeker, Blen. en Gob. p. 27.

Page 287, *for* "*Gobius cyanosmos*" *read* "*Gobius cyanomos.*"

Page 294, 3 lines from bottom, *for* "Plate LXVII" *read* "Plate LXVI."

Page 299, *add* a second species of *Sicydium.*

Sicydium griseum.

Day, Journal Linnean Society, Zool. xiii, p. 140.

B. iv, D. 6 | $\frac{1}{10}$, P. 17, V. 6, A. 11, C. 13, L. l. 80, L. tr. 25.

Length of head $5\frac{1}{2}$, of caudal fin $6\frac{1}{2}$, height of body 6 in the total length. *Eyes*—diameter 4 in the length of the head, rather above 1 diameter from the end of snout, and $1\frac{1}{2}$ apart. Body subcylindrical: upper surface of the head flat, its greatest width equalling its length. Cleft of the mouth extending to below the first third of the eye. Lower jaw placed horizontally. Lips thick, the edge of the upper coarsely fringed. Snout not overhanging the mouth. No barbels. *Teeth*—in the upper jaw in a single row, small, closely set and implanted in the gums. The outer row in the lower jaw, horizontal, posterior to them and opposite the symphysis are two strong, recurved, canines. *Fins*—dorsal spines filiform, and projecting beyond the membrane: caudal rounded. *Scales*—strongly ctenoid, of irregular sizes and shapes, and in irregular rows: they extend forwards to nearly as far as the eyes: none on the sides of the head. *Colours*—brownish, with eight or nine rings of a darker tint encircling the body, and wider than the ground colour. *Fins*—dark, most deeply so at their edges.

Habitat.—South Canara, where I procured two examples in fresh water, the largest being 3 inches. They were mislaid until after p. 299 had been printed.

Page 303, 15 lines from the top, *for* "between large tadpoles" *read* "like large tadpoles."

Page 310. ELEOTRIS MACROLEPIDOTA. Professor Peters informed me, last April, that the type specimen of Bloch's fish, No. 2155, still exists at Berlin: it is in spirit, and has from 26 to 28 scales between the snout and the first dorsal fin. It is identical with the species described, p. 312, as *E. porocephalus*.

Page 336. ANDAMIA EXPANSA. This species is identical with *Salarias heteropterus*, Bleeker, Amboina, p. 65, of which Dr. Bleeker sent me an example. The original description was a little incorrect.

Page 338. A species of *Mastacembelus* has been found in West Africa.

Page 343, 5 lines from top, *for* "pectoral" *insert* "first dorsal."

Page 388, *for* "GLYPHIDODON SINDENSIS" *read* "POMACENTRUS SINDENSIS," as, since writing the description, I have obtained an example with fine serrations on its preopercle.

Page 417, 4 lines from the top, *for* "ANACANTHININI" *insert* "ANACANTHINI."

Page 449, 3 lines from the bottom, *for* "fig. 3" *read* "fig. 5."

Page 462, 21 lines from the bottom, *for* "Plate XCV" *read* "CV."

Page 498, 18 lines from the top, *for* "circular profile" *read* "circular pupil."

Page 524, last line, *after* "scales" *insert* "*Lepidocephalichthys*."

Page 528, 6 lines from top, *erase* "*gotyla*."

Page 535, 34 lines from bottom, *for* "18 *Labeo dero*," &c., *read* "18 *Labeo microphthalmus*, D. 13, L. l. 41-43, L. tr. 8/9, 2 barbels. Himalayas."

Page 538, 11 lines from top, *for* "*G. cursis*," *read* "*L. cursis*."

Page 559, 19 lines from top, *for* "L. l. 23-36" *read* "L. l. 23-26."

Page 559, 13 lines from bottom, *for* "pl. 9" *read* "pl. 29."

Page 568, 10 lines from top, *for* "CL" *read* "CXL."

Page 578, 8 lines from top, *for* "behind" *read* "close to."

Page 584, *add* to synonyms of RASBORA ELANGA, "*Bengala elanga*, Gray and Hardw. Ill. Ind. Zool. (From H. B.'s MSS.)."

Page 612, 16 lines from bottom, *after* "Burma" *insert* "to the Malay Archipelago."

Page 635, 4 lines from top, *for* "CLUPEA KOWAL," *read* "CLUPEA BRACHYSOMA."

ALPHABETICAL INDEX.

aart-candee, 592
abatoo, 685
abbreviata, Cepola, 324
abbreviatus, *Bagrus*, 445
abbreviatus, *Diapterus*, 100
abbreviatus, Gerres, 99, 100
abbreviatus, *Nauclerus*, 229
ab-bro-ny, 295
abhortani, Chætodon, 108
abhortani, Julis, 405
abnormis, *Ilisha*, 643
abramioides, *Cyprinus*, 553
abramioides, *Hypselobarbus*, 553
abu dafar, *Chætodon*, 381
abu-nigaterin, *Sciæna*, 81
abu-senduk, 696
Acanthacobitis, 612
Acanthaluteres, 692
Acanthinion, 232
Acanthocephala, 324
Acanthocybium, 254
Acanthogobius, 282
ACANTHOPTERYGIANS, xiv, xv
Acanthopterygians, how numbers of spines, rays, and scales often vary, 127
Acanthophthalmus, 605, 610
Acanthopsis, 605, 608
acanthopterus, *Leuciscus*, 592
acanthopterus, *Opsarius*, 592
Acanthostracion, 695
ACANTHURIDÆ, 202
Acanthurinæ, 202
Acanthuroidei, 202
Acanthurus, 202
Acentrogobius, 282
Acentronura, 676, 681
acheirus kukur jibha, 436
Achiroides, 428
Achirophichthys, 664
Achirus, 421, 427
acinaces, *Leuciscus*, 601, 602
Aclyptosternon, 499
Acoura, 612
Acourus, 612
acra, *Cyprinus*, 542
Acronuridæ, 202
Acronurus, 202
Actiniæ, 380
Actinogobius, 282
aculeata, Rhynchobdella, 338
aculeata, *Schistura*, 609
aculeata, *Scorpæna*, 380
aculeatum, *Ophidium*, 338
aculeatus, Balistes, 687, 690
aculeatus, Chorinemus, 231
aculeatus, *Mastacembelus*, 338
aculeatus minor, Balistes, 691
acuminata, *Ophisurus*, 664
acuminatus, *Chætodon*, 110
acuminatus, Heniochus, 110
acus, Fierasfer, 658
acuta, Dussumieria, 647, 648
acuta, Sillago, 265
acutidens, Carcharias, 711, 713
acutipinnis, Gobius, 291
acutipinnis, Sphyræna, 342
acutirostris, Arius, 457, 459
acutirostris, Pseudeutropius, 471, 472
acutus, Carcharias, 711, 712
adamsii, Minous, 159
adavalan tirike, 740
addi, 444
adensis, Glyphidodon, 385
adoee, 532
adhesipinnis, *Uranoscopus*, 164
adspersa, Rhinoptera, 743, 744
adspersus, Balistes, 688
adugu-pal sorrah, 716
adustus, Myripristis, 169
adustus, Pseudochromis, 268
adscensionis, *Trachinus*, 14
ægyptius, *Acronurus*, 209
æquibarbis, Arius, 459
æquipinnatus, Danio, 595, 596
æquipinnatus, *Leuciscus*, 596
æquipinnatus, *Perilampus*, 596
æquipinnatus, *Pteropsarion*, 596
æquipinnis, *Salarias*, 336
æqualæformis, Gazza, 244
aerostaticus, Tetrodon, 705
æruginosus, Julis, 405
æruginosus, Pseudoscarus, 411, 412
æruginosus, *Scarus*, 412
Æsopia, 428
Æobatis, 742, 743
Ætoplatea, 741
afer, *Gymnothorax*, 671
affine, Diagramma, 78
affinis, Ailia, 489
affinis, Aplocheilus, 522
affinis, Atherina, 344
affinis, *Bagrus*, 445, 448, 449, 492
affinis, *Batasio*, 445
affinis, Callichrous, 476
affinis, Caranx, 219
affinis, *Cirrhinus*, 536
affinis, *Clupea*, 643
affinis, Macrones, 445
affinis, Ophiocephalus, 368
affinis, Pellona, 643
affinis, *Pelecus*, 602
affinis, *Perilampus*, 596
affinis, *Platygaster*, 643
affinis, Rhinoptera, 744
affinis, Trachinotus, 234
affinis, Thynnus, 252
affinis, Uranoscopus, 260
afghana, Silurus, 480, 481
afra, Muræna, 667, 671, 672
afra, *Murænophis*, 671
africana, *Anacanthus*, 736
africana, *Raja*, 736
African element in Indian Fish, xii
africanus, *Rhachinotus*, 736
africanus, Urogymnus, 736
agassizi, *Gymnothorax*, 671
agassizi, Muræna, 671
ageneiosus, Batrachocephalus, 468
agrensis, *Platacanthus*, 610
agricolus, *Bagrus*, 449
Agriopus, 160
aguskitti, 590
ah-hee, 473
ah-ku-lah, 255
ahra ramah, 317
Ailia, 441, 488
Ailiichthys, 441, 489
air-vessel in Arius, 456
air-vessel in Siluridæ, 440
akallopisus, Amphiprion, 378, 380
aken-parah, Scomber, 231
akku-jellah, 473
ak-ku-rati, 50
alatus, Apistus, 155
alatus, *Polemius*, 155
Alausa, 634
Alausella, 634
albacora, Thynnus, 253
alba, *Muræna*, 656
albescens, Canthophrys, 608
albescens, Echeneis, 258
albescens, *Remora*, 259
albicauda, Echeneis, 257
albicaudus, Balistes, 688
albicaudatus, *Melichthys*, 688
albida, *Corvina*, 188
albidactylus, Exocœtus, 519
albida, Sciæna, 188
albilabrus, *Bagrus*, 445
albinus, *Pneumobranchus*, 656
albipunctatus, Platax, 236
albofasciatus, Pomacentrus, 382, 384
albofuscus, *Epinephelus*, 14
albofuscus, *Holocentrus*, 14
albofuscus, Serranus, 14
alboguttata, *Diacope*, 37
alboguttatus, Salarias, 329, 334
alboguttatus, Serranus, 21
albolineata, *Nuria*, 597
albolineatus, Danio, 595, 597
albomaculata, Synaptura, 428, 429
alboplumbeus, *Gastrophysus*, 702
alboplumbeus, Tetraodon, 702
albopunctatus, *Amphacanthus*, 168
albopunctatus, Gobius, 294
albopunctatus, Teuthis, 168
alborubrum, Holocentrum, 172
albovittatum, Diagramma, 78, 79, 80, 747
albovittatus, *Plectorhynchus*, 78
Albula, 623, 648
Albulæformes, 623, 648
albula, Mugil, 352
albulus, *Opsarius*, 602
alburna, *Chela*, 595
alburnus, Barilius, 589
alburnus, Danio, 596
albus, Engraulis, 629
albus, Stromateus, 246
Alepocephalus, 658
aleppensis, Mastacembelus, 341
alfredianus, *Leuciscus*, 587
alfredianus, *Osteobrama*, 587
alli, 444
alise, 643
alluvial plains of India, xiv
almorhæ, Botia, 606, 607
alkootee, Chela, 599
Alpine sources of rivers, ix
alta, Ambassis, 51
alta, *Garra*, 528
alta, Nuria, 583
alternans, *Ophisurus*, 665
Alticus, 328, 329
alticus, *Rupiscartes*, 330
alticus, Salarias, 330
altipinnis, Pimelepterus, 143
altispinis, Gerres, 78, 97
altivelioides, *Epinephelus*, 20
altivelioides, Serranus, 20
altivelis, Cromileptes, 8, 9
altivelis, *Serranus*, 9
altum, Diagramma, 78
altus, Chatoessus, 634

Alutarius, 692
Aluteres, 692
Alysia, 506
amarulus, Mugil, 348, 356
Amanses, 692
amatti-katti, 249
Ambassis, 49
ambassis, Barbus, 558, 576
ambassis, *Centropomus*, 52, 53
Ambassoidei, 5
Ambassus, 49
ambata-kuttee, *Zeus*, 249
Amblyapistus, 157
amblycephalus, Julis, 403, 404
amblycephalus, Umbrina, 183
Amblyceps, 441, 490
Amblychaeturichthys, 282
Amblyeirrhitus, 144
Amblygaster, 634
Amblygobius, 282
Amblyodon, 184
Amblyopodiformes, 282
Amblyopodini, 282
Amblyopus, 316
Amblypharyngodon, xv, 554, 604
Amblyrhynchote, 699
amblyurus, Hemiramphus, 517
amblyurus, *Zenarchopterus*, 517
amboinensis, *Balistes*, 689
amboinensis, *Butis*, 316
amboinensis, Eleotris, 316
amboinensis, *Genyoroge*, 33
amboinensis, Lethrinus, 137
amboinensis, Lutianus, 29, 34
amboinensis, *Pisciculus*, 280
amboinensis, *Rhinecanthus*, 689
amboinensis, Serranus, 13
ambutan-parah, 249
ambutan wahlah, 653
americanus, Balistes, 689
americanus, Histiophorus, 199
americanus, *Odontaspis*, 713, 722
amherstinus, *Apogon*, 124
Amia, 56
amlee, 585
Ammodytes, 419
amnicola, *Cobitis*, 608
amphacanthoides, *Alutarius*, 693
Amphacanthus, 165
amphibia, *Capoeta*, 574
amphibius, Barbus, 558, 574
amphibius, *Blennius*, 330
amphibius, Ophiocephalus, 365
amphibius, *Systomus*, 574
AMPHIPNINA, 655
Amphipnous, 655
Amphiprion, 377
Amphiprionichthys, 158
Amphisile, 361
Amphisiloidei, 361
Anabas, x, 369
Anabantidæ, 369
anabatoides, *Glyphidodon*, 389
ANACANTHINI, 417
ANACANTHINI GADOIDEI, 417
ANACANTHINI PLEURONECTOIDEI, 417, 421
Anacanthus, 684, 694
Anacanthus, 736
anadromous fish, x
anago, *Conger*, 660
anago, Congromuræna, 660
anagoides, *Conger*, 660
anagoides, Congromuræna, 660
anagoides, *Ophisoma*, 660
Anampses, 390, 395
anastoma, *Chela*, 598
anastomella, *Mastacembelus*, 511
anastomus, Callichrous, 479
anastomus, *Silurus*, 479
anastomus, *Wallago*, 479
ana-toumbi, 279
a nageoires lie de vin, Pterois, 154
Anchisomus, 699
anchorago, Chærops, 391
anchorago, *Cossyphus*, 391
anchorago, *Sparus*, 391
ancylostomus, *Rhamphobatis*, 730
ancylostomus, *Rhina*, 730
ancylostomus, Rhynchobatus, 730
andamanense, Holocentrum, 171, 172
andamanensis, Arius, 463
andamanensis, Gobius, 288
andamanensis, Salarias, 329, 332
Andamia, 329, 335
Anderson, Dr. J., vi
andersonii, Exostoma, 501
andersonii, Salarias, 329, 331
anei, *Corvina*, 189
anei, *Johnius*, 188
Anema, 261
Anematichthys, 556
aneus, *Johnius*, 189
aneus, *Otolithus*, 189
aneus, Sciæna, 189
anginosus, *Aluterus*, 693
angra, *Cyprinus*, 541
angra, *Gobio*, 541, 549
angra, Labeo, 535, 541
angrioides, *Gobio*, 549
Anguilla, 658, 659
anguilla, *Muræna*, 659, 660
anguillaris, *Amblyopus*, 319
anguillaris, *Clarias*, 483
anguillaris, Gobioides, 317
anguillaris, *Gobius*, 317
anguillaris, *Platystacus*, 483
anguillaris, Plotosus, 483
anguillaris, *Silurus*, 485
anguilliformis, Gobioides, 317
anguis, *Bagrus*, 473
anguis, *Pimelodus*, 473
Anguisurus, 664
angularis, Serranus, 22
angulatus, Coris, 408
angulatus, *Esox*, 516
angulosus, Balistes, 688
angulosus, *Labrus*, 173
angustidens, *Congrus*, 662
anicuts, bunds, or weirs
anisocheilus, *Opsarius*, 591
Anisotremus, 72
anisura, *Cirrhina*, 542
anisura, *Platycara*, 526
anisurus, *Gobio*, 542
anisurus, *Pimelodus*, 448
anjana, *Cyprinus*, 584
anjana, *Leuciscus*, 584
anjani, 584
ankatilla, 685
Anosmius, 699
anna-carolina, Mene, 249
annularis, Acanthurus, 205
annularis, Apogon, 61
annularis, *Chætodon*, 112, 113
annularis, *Diacope*, 32
annularis, Holacanthus, 102, 112
annularis, *Julis*, 398
annularis, *Lutjanus*, 32
annularis, *Mesoprion*, 32
annularis, *Nauclerus*, 229
annularis, Platyglossus, 398
annulata, Belone, 509, 510
annulata, *Muræna*, 665
annulata, *Pastinaca*, 741
annulata, Pteroplatea, 741
annulatus, *Gymnothorax*, 665
annulatus, *Mastacembelus*, 510
Anomiolepis, 195
anoovah-meen, 28
antecessor, *Gasterosteus*, 229
Antennarius, 271
Anthias, 27, 746
antika-doondiawah, *Sparus*, 41
antiquorum, Pristis, 729
antjerius, Glyphidodon, 385, 387
Anodontostoma, 632
Anyperodon, 8
aor, *Bagrus*, 444
aorellus, *Bagrus*, 444
aor, Macrones, 442, 444, 445
aor, *Pimelodus*, 444
aorides, *Bagrus*, 444
aorinus, *Bagrus*, 444
apalike, *Elops*, 650
Aphanius, 521
Aphthalmichthys, 666
apiatus, *Cyprinus*, 590
Apistus, 154
Apistus, 156, 157
Aplocheilus, 521
aplodactylus, Scorpæna, 149
Apocrypteini, 281
Apocryptes, 299
Apocryptichthys, 302
Apocryptini, 299
Apocryptodon, 299
Apodontis, 254
Apogon, 56
apogon, Barbus, 525, 558, 575
apogon, *Cyclocheilichthys*, 576
Apogonichthys, 56
APOGONINA, 49
apogonoides, *Cyclocheilichthys*, 576
apogonoides, *Systomus*, 575
apogon, *Systomus*, 575
Apolectus, 246, 254
Aprion, 710, 746
Aprinodon, 710, 713
Apseudobranchus, 195
Apsicephalus, 699
Apterigia, 656
Apterygia, 646
Apterichthys, 663
Apua, 489, 605, 611
arabica, *Muræna*, 662
arabica, *Perca*, 66
arabicus, Chanos, 651
arabicus, Cheilodipterus, 66
arab, Plotosus, 467, 482, 483
arab, *Silurus*, 483
Aracana, 695
aral, 338
aralu, 431
aral, Rhynchobdella, 338
araneus, *Chætodon*, 381
a-ra-wud-dah, 276
Archamia, 56
Archoscion, 195
arcuatum, Tetradrachmum, 381
arcuatus, *Chætodon*, 381
arcus, Ostracion, 697
aree, 140
arel, Cynoglossus, 432, 434
arelia, 431
arel, *Pleuronectes*, 431, 434
arenata, *Cobitis*, 621
arenata, *Thyrsoidea*, 672
arenatus, Barbus, 558, 574
areolata, *Perca*, 12
areolatus, Serranus, 12
areolatus, Serranus, 22
argentata, *Acoura*, 621
argentata, *Clupisoma*, 474
argentata, Corica, 642
argentata, *Perca*, 37
argentata, *Sciæna*, 37
argentatus, *Labrus*, 37, 404
argentatus, *Promecocephalus*, 702
argentatus, Tetraodon, 702
argentea, Chela, 600, 601, 602
argentea, Datnia, 71
argentea, *Perca*, 67
argentea, *Sciæna*, 74
argenteum Pristipoma, 74
argenteus, *Acanthopodus*, 235
argenteus, Apogon, 64
argenteus, *Butirinus*, 651
argenteus, *Chætodon*, 235
argenteus (Datnia) *Therapon*, 71
argenteus, Dules, 67
argenteus, *Esox*, 649
argenteus, *Gastrophysus*, 702
argenteus, Haplochilus, 522
argenteus, *Leiognathus*, 238
argenteus, *Monodactylus*, 235
argenteus, Otolithus, 197
argenteus, Psettus, 235
argenteus, Stromateus, 247
argenteus, *Synodus*, 649
argenteus, Tetrodon, 701
argenteus, *Therapon*, 71
argenteus, *Pomadasis*, 74
argentilineatus, Periophthalmus, 303
argentimaculata, *Diacope*, 38
argentimaculata, *Sciæna*, 37
argentimaculatus, Lutianus, 37, 38
argentimaculatus, *Lutjanus*, 38
argentimaculatus, *Mesoprion*, 38
argus, *Cacodoxus*, 114
argus, *Cephalopholis*, 24
argus, *Chætodon*, 114
argus, *Epinephelus*, 24
argus, Scatophagus, 114, 115
argus, Serranus, 24
argyreum, Pristipoma, 75, 76
argyrophanes, Saurida, 505
argyrophanes, *Saurus*, 504
argyropleura, Tetraodon, 702
Argyrops, 138
argyrosoma, *Lycogenis*, 89
argyrostictus, Syngnathus, 678
argyrotænia, Clupea, 634, 639
argyrotænia, *Rogenia*, 638
argyrozona, *Priopis*, 54
argyrosomus, Scolopsis, 87
argyrurus, Coryphæna, 248
Arhamphus, 512
aries, Chrysophrys, 142
a-rig-dah, 312
Ariodes, 456
arioides, Arius, 458
arioides, *Bagrus*, 458
Ariosoma, 660
Arius, 439, 440, 456
arius, Arius, 463, 465
arius, eggs of, 456
arius, mode of breeding, 456
arius, *Pimelodus*, 463, 465, 467
ariza, 543
ariza, *Cyprinus*, 544
ariza, Labeo, 535, 544
ariza, *Tylognathus*, 544
armata, *Citula*, 223

armata, *Sciœna*, 223
armatus, Balistes, 688, 691
armatus, *Carangoides*, 223
armatus, Caranx, 211, 223
armata, Scorpæna, 149
armatus, *Hypselobagrus*, 450
armatus, *Macrognathus*, 340
armatus, Macrones, 443, 450
armatus, Mastacembelus, 339, 340, 341
armatus, Rhinobatus, 732
armatus, Trichiurus, 201
armé, Baliste, 688
Arothron, 699
aroubiensis, Apogon, 60
arracana, Anguilla, 659
arranna, 505
arriti-ki, 265
arsius, Pseudorhombus, 423
arsius, *Rhombus*, 423
aruanum, Tetradrachmum, 381
aruanus, *Chætodon*, 381
aruanus, *Dascyllus*, 381
aruanus, *Lutjanus*, 381
aruanus, *Pomacentrus*, 381
arulius, Barbus, 29, 558, 575
arulius, Barbus, 570
arulius, *Systomus*, 575
arundinaceus, *Ptyobranchus*, 666
aruset, Holacanthus, 112
aruzu, 547
Aseraggodes, 425
asfur, *Chætodon*, 112
asfur, Holacanthus, 112
asfur, *Pomacanthus*, 112
asper, Sciænoides, 187
asotus, Silurus, 480
asotus, Wallagoo, 480
asperrima, *Raja*, 736
asperrimus, *Anacanthus*, 736
asperrimus, Urogymnus, 736
Aspidobagrus, 442
Aspidontus, 326
Aspidoparia, xv, 585, 605
aspilos, Tetrodon, 704
aspilus, Salarias, 329
Aspinurus, 208
assamensis, Clarias, 484, 485
assaree, 610
assimilis, *Systomus*, 582
Asterropteryx, 309
Asthenurus, 417
Astrape, 733
Astrocanthus, 273
astrotœnia, *Crayracion*, 705
astrotœnia, Tetrodon, 705
atherina, 344
athu, *Silurus*, 479
ATHERINIDÆ, 344
atherinoides, *Bagrus*, 473
atherinoides, *Clupea*, 629
atherinoides, Pseudeutropius, 471, 473
atherinoides, *Pachypterus*, 473
atherinoides, *Silurus*, 473
atkinsonii, Amblypharyngodon, 554, 555
atkinsonii, *Mola*, 555
atookaia, *Stromateoides*, 246
atoo-koia, Stromateus, 246
atous, Stromateus, 246
atpar, *Cachius*, 598
atpar, *Chela*, 598
atpar, *Cyprinus*, 598
atpar, *Leuciscus*, 598
atpar, Perilampus, 598
Atractoscion, 196
atricauda, Clupea, 635, 636
atringa, Diodon, 708
atripinnis, *Asthenurus*, 418
atripinnis, Bregmaceros, 418
atrocissimus, Trygon, 738
atromaculatus, *Chætodon*, 114
atropus, *Brama*, 221
atropus, *Carangoides*, 221
atropus, Caranx, 211, 221
atropus, *Olistus*, 221
attu, *Silurus*, 479
attu, Wallago, 479
auchenotænia, Gobius, 288
auctorum, Lobotes, 84
aucupatorius, Boleophthalmus, 307
AULOSTOMATEIDÆ, 360
aurantiacus, Ophiocephalus, 367
aurantius, *Lutjanus*, 80
aurata, *Perca*, 87
aurata, *Scolopsides*, 87
auratus, Carassius, 552
auratus, *Carassius*, 543
auratus, Cheilio, 407
auratus, Engraulis, 627
auratus, *Hemiulis*, 407
auratus, *Lutjanus*, 87
auratus, Monacanthus, 693
auratus, *Pimelodus*, 458
auratus, Psenes, 237
auratus, Scolopsis, 87, 88
aurea, *Amia*, 61
aurea, Clupea, 634
aureo-maculatus, *Labrus*, 408
aureovittatus, *Lutjanus*, 87
aureovittatus, *Mullus*, 122
aureus, Apogon, 61
aureus, *Centropomus*, 61
aureus, *Cirrhites*, 145
aureus, Cirrhitichthys, 145
aureus, Citharichthys, 422
aureus, *Clupanodon*, 634
aureus, Nemacheilus, 614, 615
aureus, Polynemus, 176
auriflamma, Mulloides, 122
auriflamma, *Mullus*, 122, 123
auriflamma, *Upeneus*, 122
auriga, Chætodon, 106
auriga, *Linophora*, 106
auriga, Monacanthus, 693
auritus, Apogon, 63
auritus, *Apogonichthys*, 63
aurolineatus, *Gnathodentex*, 93
aurolineatus, *Mesoprion*, 41
aurolineatus, Ophiocephalus, 363
aurolineatus, *Paradanio*, 596
aurolineatus, Pentapus, 93
aurolineatus, Acanthurus, 204
aurolineatus Pristipomatoides, 95
aurolineatus, *Sparus*, 93
australis, *Atherina*, 629
australis, Echeneis, 257
australis, *Platycara*, 526
australis, *Teuthis*, 204
austriacus, Chætodon, 107
Awaous, 282
axillaris, Cossyphus, 392
axillaris, *Diacope*, 44, 45
axillaris, *Labrus*, 392
axillaris, Mugil, 348, 355
axillaris, Sciæna, 188
axillaris, *Corvina*, 188
Axinurus, 208
aygula, *Chlorichthys*, 408
aygula, Coris, 407, 408
aygula, *Julis*, 408
Aylopon, 27
azureus, Balistes, 688

baal, 247
bacaila, Chela, 600, 603
bacaila, *Cyprinus*, 603
bacaila, *Leuciscus*, 603
bacaila, *Opsarius*, 603
baculis, Ambassis, 51
baculis, *Chanda*, 51
badahlan, 248
badi mottah, 504
badimottah, *Saurus*, 504
Badis, 127, 128
badi, *Saurus*, 504
badis, *Labrus*, 128
badjee, *Mystus*, 653
bad-vaad-hi, 129
Bagarius, 442, 495
Bagarius, air-vessel of, 495
bagarius, *Pimelodus*, 495
bagio, *Conger*, 662
bagio, *Murœna*, 662
bagio, Murænesox, 662
Bagrus, 442
bahiensis, *Engraulis*, 649
babiensis, Exocœtus, 518, 519
bahamensis, *Vulpes*, 649
bahm, 340
bah-mear, 141
bahri, 592
bahru, 340
bahrul, *Centropomus*, 52
bahrum, 536
bah-say-lee, 373
bahtoor, 537
Baidiella, 184
baillonii, *Cæsiomorus*, 233
baillonii, *Trachinotus*, 233
baillonii, Trachynotus, 233
bainsa-saylee, 373
bajad, Caranx, 217
bakeri, Barilius, 589, 591
bakeri, Robtee, 586
bakeri, *Pteropsarion*, 591
balah-kera, 313
Balantiocheilus, 556
balantiophthalmus, *Scomber*, 217
balinensis, Apogon, 60
Balfour, Surgeon-General, 718
balgara, *Cobitis*, 609
balgara, Lepidocephalichthys, 609
balgara, *Schistura*, 609
balinensis, Engraulis, 629
balinensis, Glyphysodon, 387
Balistapus, 686
Balistes, 684, 686
BALISTINA, 684, 686
balisundree, 592
Balitora, 525
balitora, *Cyprinus*, 527
balitora, Psilorhynchus, 527
balli-potiah, 614
balookee, Chela, 602
balteatum, Diagramma, 77, 82
balteatus, *Plectorhynchus*, 82
balteatus, Smaris, 94
balu, 610
bananus, Albula, 649
bandanensis, Glyphisodon, 389
bankamensis, Lethrinus, 137
bankanensis, *Amia*, 101
bankanensis, Apogon, 101
bankanensis, Pomacentrus, 382, 383
banki yeddu, 455
bankoe, 598
Bangana, 534, 547
bango, 542
bangon, 350
bangon, *Cyprinus*, 549
bangon, *Gobio*, 549
bangum-batta, 543
baor, 7
bara, 338
barbata, *Scorpœna*, 150
barbatulus, *Crossocheilus*, 548
barbatulus, *Tylognathus*, 548
barbatus, *Alutarius*, 694
barbatus, *Aluterus*, 694
barbatus, *Balistes*, 694
barbatus, *Leuciscus*, 583
barbatus, *Mullus*, 126
barbatus, *Pogonognathus*, 694
barbatus, *Psilocephalus*, 694
barbatus, Schizothorax, 531
barberinus, *Mullus*, 124
barberinus, *Parupeneus*, 124
barberinus, Upeneus, 124
Barber's knife, 653
barbula, *Lija*, 693
Barbus, xv, 556, 604
barca, Ophiocephalus, 363, 365
bareing, 554
barila, Barilius, 589, 591
barila, *Cyprinus*, 591
barila, *Leuciscus*, 591
Barilius, 588, 592, 605
barkur, 553
barlovi, Ambassis, 51
barna, Barilius, 589, 592
barna, *Cyprinus*, 592
barna, *Leuciscus*, 592
barsee, 599
basanguti, 489
Basket parrot, 399
bassensis, Sillago, 265
bata, *Crossocheilus*, 542
bata, *Cyprinus*, 542
bata, Labeo, 535, 542, 544
Batasio, 492
batasio, *Bagrus*, 493
batasio, Gagata, 492, 493
batasio, *Macrones*, 493
batasio, *Pimelodus*, 492, 493
batasius, *Pimelodus*, 447, 448
batausi, 489
Bathymaster, 417
batjanensis, Ambassis, 53
bato, Apocryptes, 302
bato, *Gobius*, 302
BATOIDEI, 709, 727
batoides, Apocryptes, 301
BATRACHIDÆ, 269
Batrachocephalus, 440, 468
Batrachops, 699
Batrachus, 269
batrachus, Clarias, 485
batrachus, *Macropteronotus*, 485
batrachus, *Silurus*, 485
batta, 549
battuli, 473
batuensis, Muræna, 671
bayi, 585
bay-ree-saie, 599
Beavan—Fresh-water Fishes of India, 567
beavani, Barbus, 559
beavani, Nemacheilus, 613, 620
Bedula, 129
beeri, Balistes, 690
beeshatara, 114
begti, 7
behrah, 548
bejeus, *Colisa*, 374, 375
bejeus, *Trichopodus*, 374
bekkut, 7
belanak, Mugil, 347, 351
belangeri, *Cirrhinus*, 536
belangerii, Arius, 467
belangeri, *Leuciscus*, 587
belangeri, *Rohita*, 536

belangerii, Rohtee, 586, 587
belangeri, *Smiliogaster*, 587
belangeri, Xenopterus, 699
belcheri, Callionymus, 322
belcheri, Psettodes, 422
belcheri, *Sphagomorus*, 422
belengeri, *Apistus*, 156
belengeri, Caranx, 216
belengeri, *Corvina*, 191
belengeri, *Johnius*, 191
belengeri, Sciæna, 191, 193
belengeri, *Tetraroge*, 156
beli korava, 368
bellus, Salarias, 332
Belobranchus, 309
Belone, 509
Belonichthys, 679
belookee, *Leuciscus*, 602
bendelisis, Barilius, 589, 590, 591
bendelisis, *Cyprinus*, 590
bendelisis, *Gobio*, 590
bendelisis, *Opsarius*, 590
bengalensis, Ailia, 488, 489
bengalensis, Anguilla, 659
bengalensis, *Chætodon*, 387
bengalensis, Cynoglossus, 432, 435
bengalensis, *Genyoroge*, 33
bengalensis, *Genyoroge*, 46
bengalensis, Glyphidodon, 385, 387
bengalensis, *Holocentrus*, 33
bengalensis, Lutianus, 29, 33, 34
bengalensis, *Lutjanus*, 33
bengalensis Malapterus, 488
bengalensis, *Mesoprion*, 46
bengalensis, *Mrigala*, 549
bengalensis, Muræuesox, 662
bengalensis, *Ophisternon*, 657
bengalensis, *Plagusia*, 435
bengalensis, Symbranchus, 657
Bennett, Mr. J., iii
bennetti, *Anosmius*, 708
bennetti, Dules, 67
bennetti, *Psilonotus*, 708
bennetti, *Tropidichthys*, 708
bennettii, Trygon, 737, 738
bensasi, *Mullus*, 121
bensasi, Upeneoides, 121
berardi, *Aleuteres*, 693
berbis, Equula, 243
berda, Chrysophrys, 140
berdmorei, *Acanthopsis*, 610
berdmorei, Botia, 606, 607
berdmorei, *Cobitis*, 610
berdmorei, Dangila, 546
berdmorei, Exostoma, 501, 502
berdmorei, Lepidocephalichthys, 609
berdmorei, *Silurichthys*, 481
berdmorei, *Syncrossus*, 607
BERYCIDÆ, 169
bhat, 179
bhot mogur, 498
biaculeatus, *Balistes*, 685
biaculeatus, *Chætodon*, 380
biaculeatus, Gastrotokeus, 681
biaculeatus, *Holacanthus*, 380
biaculeatus, *Monoceros*, 209
biaculeatus, Premnas, 380
biaculeatus, *Syngnathus*, 681
biauritus, *Collichthys*, 194
biauritus, *Otolithus*, 194
biauritus, Sciænoides, 194
bicatenatus, Julis, 404
bichu-gende, 286
bicinctus, Amphiprion, 379
bicirrhatus, Barilius, 589
bicirrhatus, *Leuciscus*, 589
bicirrhatus. *Opsarius*, 589
bicolor, Anguilla, 659, 660
bicolor, Balistes, 689
bicolor, Cheilio, 407
bicolor, *Gobio*, 540
bicolor, *Labrichthys*, 396
bicolor, Tetraodon, 702
bi-dah, 598
biddulphi, Schizothorax, 532
Bidie, Dr., vi
bidii, Caranx, 225
bifasciata, Chrysophrys, 141
bifasciatum, Amphiprion, 378, 379
bifasciatum, Diploprion, 28
bifasciatus, *Anthias*, 379
bifasciatus, Apogon, 62
bifasciatus, Apogon, 62
bifasciatus, *Chætodon*, 141
bifasciatus, *Chætodon*, 110
bifasciatus, *Holocentrus*, 379
bifasciatus, Platyglossus, 398
bifasciatus, Pomacentrus, 382, 383
bigibbus, Antennarius, 271
biguttatus, Lutianus, 34
biguttatus, *Lutjanus*, 34
biguttatus, *Serranus*, 34
bilineata, Homaloptera, 526
bilineata, Muræna, 671
bilineata, *Perca*, 28
bilineata, Plagusia, 431
bilineatus, *Achirus*, 435
bilineatus, *Anthias*, 85
bilineatus, Arius, 467
bilineatus, *Bagrus*, 463
bilineatus, *Pleuronectes*, 431
bilineatus, Scolopsis, 85
bilineatus, *Scolopsides*, 85
bilitonensis, Salarias, 329, 334
bilk songtak, 374
billi, 490
bil-turi, 614
bilturio, *Cobitis*, 614
bimaculatus, Callichrous, 476, 477, 478
bimaculatus, *Gonorhynchus*, 527
bimaculatus, *Halichœres*, 401
bimaculatus, *Julis*, 401
bimaculatus, Platyglossus, 398, 401
bimaculatus, *Pseudosilurus*, 477
bimaculatus, Scolopsis, 85
bimaculatus, *Scolopsides*, 85
bimaculatus, *Silurus*, 476
bimaculatus, *Silurus*, 476, 477
bimucronata, *Cobitis*, 614
bindoo-karah, *Zeus*, 240
bindoides, Equula, 240
bindus, Equula, 240
binotata, Seriola, 227
binotatus, *Coius*, 96
binotatus. *Leuciscus*, 570
biocellatus, Chætodon, 108
biocellatus, Glyphisodon, 387
biocellatus, *Gobius*, 289
biocellatus, Pomacentrus, 382
bipes, *Balistes*, 685
bipinnulata, *Seriola*, 228
bipinnulatus, *Elagatis*, 228
bipinnulatus, Seriolichthys, 228
bipunctatus, *Dentex*, 92
bipunctatus, Petroscirtes, 326, 327
birmannus, *Bagrus*, 445
biserialis, Syngnathus, 678
biserratus, *Silurus*, 486
bispinosa, Somileptes, 608
bispinosus, Otolithus, 196
birralli, 196
bitæniata, *Diacope*, 41
bitæniatus, *Upeneus*, 120
bitchu ka mutchee, 487
bitter carp, 571
bituberculatus, Ostracion, 696
bivittata, Elacate, 256
bivittatus, Upeneoides, 120
bivittatus, *Upeneus*, 120
black caboose, 368
Bleeker, Dr., iv, vii
Bleekeria, 419
bleekeri, Acanthurus, 205
bleekeri, Anguilla, 660
bleekeri, Apocryptes, 300
bleekeri, Apogon, 64
bleekeri, *Archamia*, 64
bleekeri, Barilius, 589
bleekeri, Carcharias, 711, 715
bleekeri. Cirrhitichthys, 145
bleekeri, Doryichthys, 679, 680
bleekeri, Gobius, 289
bleekeri, Hemiramphus, 517
bleekeri, *Lutjanus*, 34
bleekeri, Macrones, 443, 451
bleekeri, *Mesoprion*, 34
bleekeri, *Microphis*, 680
bleekeri, Sciæna, 185
bleekeri, Scolopsis, 85, 87
bleekeri, Scorpæna, 747
bleekeri, Synagris, 92
bleekeri, Trygon, 737, 738
Blennechis, 326
BLENNIIDÆ, 325
Blennius, 325
Blepharis, 210, 211
Bloch, ii
blochii, Acanthurus, 207
blochii, *Cæsiomorus*, 234
blochii, *Cheilinus*, 396
blochii, *Cirrhina*, 547
blochii, *Clupeonia*, 640
blochii, *Dentex*, 92
blochii, Diagramma, 79, 82
blochii, Equula, 241
blochii, Kurtus, 174
blochii, *Lutjanus*, 47
blochii, Plagusia, 431
blochii, Platax, 236
blochii, *Plectorhynchus*, 82
blochii, Priacanthus, 48
blochii, *Sphyrna*, 719
blochii, *Solenognathus*, 681
blochii, *Syngnathoides*, 681
blochii, *Thalliurus*, 393
blochii, Trachinotus, 234
blochii, Zygæna, 719
Blyth, Mr., v
blythii, Barbus, 558, 570
blythii, Exostoma, 501
blythii, *Macrones*, 442, 445
blythii, Nemacheilus, 613, 621
blythii, Rohtee, 587
boakei, Arius, 464
boalis, *Schilbe*, 480
boalis, *Silurus*, 479
boalla, 540
boassa, 553
bobree, *Leuciscus*, 536
bobree, *Varicorhinus*, 536
boddaertii, *Acanthopus*, 113
boddaertii, Boleophthalmus, 307
boddaerti, Boleophthalmus, 308
boddaertii, *Chætodon*, 113
boddaerti, *Eleotris*, 307
boddaerti, *Gobius*, 307
Bodianus, 8, 9
bodosi, 129
boelama, *Clupea*, 626
boelama, Engraulis, 624, 626
boelama, *Stolephorus*, 626
boelang, *Epinephelus*, 26
boelang, Serranus, 26
boenack, *Bodianus*, 23
boenack, *Epinephelus*, 23
boenack, Serranus, 9, 23, 26
boga, *Cirrhina*, 543
boga, *Cyprinus*, 543
boga, *Gobio*, 543
boga, *Gobio*, 541
boga, Labeo, 535, 543
boga, *Tylognathus*, 542
boggut, *Chondrostoma*, 542
boggut, Labeo, 535, 542, 586
Bogoda, 49
bogoda, Ambassis, 50, 52
bogoda, *Chanda*, 50
bohar, *Diacope*, 44
bohar, Lutianus, 44
bohar, *Lutjanus*, 44
bohar, *Mesoprion*, 44
bohar, *Sciæna*, 44
boh-du-ah, 473
bokar, 564
bokee sorrah, 726
bokhat, *Raie*, 731
boka sorrah, 715
Bola, 184, 193, 588
bola, 594
bola, Barilius, 589, 594
bola, *Cyprinus*, 594
bole, 18
Boleophthalmini, 304
Boleophthalmus, 304
Bombay duck, 506
bommiday, 338
bonanus, *Butirinus*, 649
bondaroo kappa, 706
bondarus, Tetrodon, 706
bonito, 252
bonkuaso, 595, 598
bontah, 353
bontah, Mugil, 353
bontianus, Notopterus, 653
bontoo, 19
bontoo, *Perca*, 19
bontoo, Serranus, 19
bool, 19
boolla, 593
boolooah, 564
boonch, 495
boopis, Chela, 600, 601, 602
boops, Caranx, 218
boops, *Selar*, 218
boorakas, 415
boorgooni, 69
booroo, 186
bo-potassi, 473
bora chung, 365
borajalee, 572
borboniensis, Echeneis, 258
borbonicus, Serranus, 15
boreala, 585
borealis, *Notorhynchus*, 723
borelio, *Cyprinus*, 599
borensis, *Diacope*, 43
borensis, *Mesoprion*, 43
borneensis, Coilia, 630, 632
borneensis, Cynoglossus, 435
borneensis, Hemiramphus, 517
borneensis, Mugil, 348, 357
boro, Ophichthys, 664
boro, *Ophisurus*, 664
boro, *Pisoodonophis*, 664
boschii, *Gymnothorax*, 672
boschii, Muræna, 671
boschii, *Thyrsoidea*, 672
Bostrichthys, 308

Bostrictis, 308
Bostrychus, 308
botahl, 187
botchee, 553
botche, Myripristis, 169
botche, *Sparus*, 169
Bothus, 425
Botia, 605, 606
botia, *Cobitis*, 614
botia, Glyptosternum, 496, 497
botia, Nemacheilus, 612, 614, 615
botius, *Pimelodus*, 497
botla-parah, Scomber, 233
botla, Scomber, 233
botlavoo-champah, Sparus, 30
bottæ, *Scarus*, 410
bottonensis, *Genyoroge*, 43
botul, 194
bottonensis, *Mesoprion*, 43
boul-la, 295
bounce-putti, 599
bounchi, 600
boutonensis, *Holocentrus*, 43
bovanicus, Barbus, 557, 566
bovianus, *Gobio*, 544
bowree, 685
boyari, 480
boyeri, Atherina, 344
brachialis, *Leuciscus*, 593
brachialis, *Opsarius*, 593
brachiata, *Scorpæna*, 162
brachiatus, Diodon, 708
brachiatus, *Leuciscus*, 590
brachio, *Scorpæna*, 162
brachio, Synanceia, 162
Brachirus, 428
brachycentrus, *Nauclerus*, 229
Brachycephalus, 699
Brachycleotris, 309
brachygaster, *Amblyopus*, 318
Brachygobii, 282
Brachygobius, 282
Brachygramma, 554
Brachyconger, 661
brachynopterus, Hemiramphus, 513, 516, 517
brachyptera, Echeneis, 258
brachypterus, *Gonorhynchus*, 527
brachyrhynchus, *Arelia*, 435
brachyrhynchus, Carcharias, 715
brachyrhynchus, Cynoglossus, 432, 435, 436
brachyrhynchus, *Plagusia*, 435,
Brachyrus, 152
brachysoma, Clarias, 484
brachysoma, Clupea, 635, 748
brachysoma, *Ilisha*, 645
brachysoma, Pellona, 642, 645
brachysoma, *Sardinella*, 635
brachysoma, Scomber, 251
brachysoma, Triacanthus, 685
Brachysomophis, 663
Branchaluteres, 692
branchiatus, *Leuciscus*, 590
Branchiosteus, 474
brasiliensis, Balistes, 690
brasiliensis, *Clupea*, 649
brasiliensis, Thynnus, 252
Bregmaceros, 417
brevicarinatus, Caranx, 221
brevicauda, *Pastinaca*, 738
breviceps, *Blennechis*, 328
breviceps, Engraulis, 624, 628
breviceps, Gobius, 294
breviceps, *Omobranchus*, 328
breviceps, Petroscirtes, 326, 328
breviceps, *Setipinna*, 628
brevicuspis, *Congrus*, 662
brevidorsalis, Copidoglanis, 489
brevidorsalis, Scaphiodon, 551, 552
brevidorsalis, *Semiplotus*, 552
brevifilis, Engraulis, 627
brevifilis, Gobius, 288
brevirostris, Anguilla, 659
brevirostris, Cynoglossus, 432, 437
brevirostris, Equula, 240
brevirostris, Equula, 241
brevirostris, Gobius, 285
brevirostris, Hemiramphus, 515
brevirostris, Histiophorus, 199
brevirostris, Naseus, 209
brevirostris, Teuthis, 168
brevirostris, Triacanthus, 685
brevis, Caranx, 220
brevis, Cynoglossus, 432, 437
brevis, *Gonorhynchus*, 548
brevis, *Ptyobranchus*, 666
brevis, *Racoma*, 532
brevis, Schizothorax, 532
brevis, *Selar*, 219
Brevoortia, 634
bridé, *Baliste*, 689
britannus, *Sparus*, 99
British Museum Catalogue, Plates of Fishes, 78
broccus, Monacanthus, 693
Brotula, 419
brownii, Engraulis, 629
brownii, *Stolephorus*, 629
brownriggii, *Chætodon*, 387
brownriggii, Glyphisodon, 387
brucei, *Balitora*, 526
brucei, Homaloptera, 525, 526
brunneus, *Buro*, 167
brunneus, *Otolithus*, 195
brunneus, Sciænoides, 195
buah, 355
buccata, Eleotris, 316
buccata, *Prionobutis*, 316
buchanani, *Amblyopus*, 318
buchanani, Arius, 458, 463
buchanani, Badis, 128
buchanani, Bagarius, 495
buchanani, *Bagrus*, 472, 473
buchanani, *Batasio*, 493
buchanani, Catla, 553
buchanani, Chaca, 482
buchanani, Cynoglossus, 436
Buchanan, Dr. Francis, ii, iii
buchanani, Gobioides, 318
buchanani, *Hara*, 452
buchanani, *Mrigala*, 548
buchanani, *Mola*, 555
buchanani, Mugil, 348, 358
buchanani, Nangra, 494
buchanani, Notopterus, 654
buchanani, *Panchax*, 523
buchanani, Pangasius, 470
buchanani, *Rama*, 451
buchanani, Rasbora, 583, 584
buchanani, Rita, 454
buchanani, *Rohita*, 538
buck-ku, 254
buckra, 50
bucktea, 606
Buffichthys, 162
buffonis, Hemiramphus, 513, 516
bufonites, *Sparus*, 142
buggarah, 594
bugguah, 594
Buglossus, 425
bukti, 549
bulaya, 477
bullata, Muræna, 670
bullee-kokah, Gobius, 295
bummaloh, 506
bummi, 340
bundei, 128
bundi, 313
bung-ka-charl, 602
bunkuai, 576
buns putta, 489
burapatra, 565
burmanica, Dangila, 546
burmanica, Olyra, 474, 475
burmanicus, Arius, 457, 458
burmanicus, Barbus, 558, 572
Burmese and Siamese sub-region, xiv
Buro, 165
burreah, 590
bursarius, Triodon, 698
bu-ru, 197
buruensis, Ambassis, 55
but, 653
butanensis, *Cobitis*, 621
butanensis, Nemacheilus, 613, 621
butchua, 472, 474, 490
Butii, 281
Butis, 309
butis, *Butis*, 315
butis, *Cheilodipterus*, 315
butis, Eleotris, 315, 316
buttonensis, *Diacope*, 43
Butyrinus, 648
bynoensis, Gobius, 284
bynoensis, *Odontogobius*, 284

caballa, Equula, 239, 240
caboose, black, 368
cabrilla, Serranus, 9
cachius, *Cyprinus*, 598
cachius, *Leuciscus*, 598
cachius, Perilampus, 598
Cacodoxus, 114
Cæcilia, 663
Cæcilophis, 663
Cæcula, 663
cæcula, *Cæpola*, 318
cæculus, *Amblyopus*, 318
cæculus, Gobioides, 318
cæcutieus, Amblyceps, 490, 491
caedra, 591
cælatoides, Arius, 459
cælatus, Arius, 457, 459
cælatus, *Cephalocassis*, 459
cælestinus, Glyphidodon, 385, 386
cærulaureus, Cæsio, 96
cæruleolineata, *Diacope*, 40, 41
cæruleolineatus, Plesiops, 128
cæruleomaculatus, Mugil, 347, 355, 356
cæruleopinnatus, Caranx, 222
cæruleopunctata, *Diacope*, 37
cæruleopunctata, *Genyoroge*, 37
cæruleopunctatus, Anampses, 395
cæruleopunctatus, *Erychthys*, 410
cæruleopunctatus, *Lutjanus*, 37
cæruleopunctatus, *Mesoprion*, 37
cæruleopunctatus, Scarichthys, 410
cæruleopunctatus, *Scarus*, 410
cæruleopunctatus, Serranus, 21
cæruleovittata, *Guntheria*, 400
cæruleovittatus, *Halichœres*, 400
cæruleovittatus, *Julis*, 400
cærulescens, Balistes, 690
cærulescens, Holacanthus, 112
cæruleus, Gomphosus, 405, 406
cæruleus, Heliastes, 389
cæruleus, Labeo, 535, 540
cæruleus, Upeneoides, 121
Cæsio, 94
Cæsiomorus, 232
cæsius, Plotosus, 482
calamaia paum, 669
calamara, *Arothron*, 705
calamara, Chrysophrys, 375
calamarah kappa, 705
calamara, *Sparus*, 140
calamara, Tetrodon, 705
calamoia pota. *Chætodon*, 385
calbasu, *Rohita*, 536
calbasu, *Cirrhinus*, 536
calbasu, *Cyprinus*, 536
calbasu, Labeo, 535, 536
calcar, *Perca*, 7
calcarifer, *Holocentrus*, 7
calcarifer, Lates, 7
Caldecott, Dr., vi
calla, Caranx, 220
Callanthias, 27
Callechelys, 664
Callicanthus, 208
Callichrous, 441, 475
CALLIONYMIDÆ, 321
Callionyminæ, 321
Callionymus, 321
Callionymus, 275
calliurus, *Scartelaos*, 301
Callogobius, 282
Callomystax, 492
Calloptilum, 417
Callyodon, 391, 410
cambon, Caranx, 220
camelinus, *Lactophrys*, 695
canada, Elacate, 256
canarensis, Barilius, 589, 592
canarensis, Eleotris, 313
canarensis, *Gobio*, 567
canarensis, *Opsarius*, 592
canarensis, *Perilampus*, 595
cancellata, Muræna, 671
cancellata, *Thyrsoidea*, 671
cancellatus, *Gymnothorax*, 671
cancellatus, *Scolopsides*, 86
cancellatus, Scolopsis, 86
cancelloides, Datnia, 71
cancila, Belone, 509, 511
cancila, *Esox*, 511
cancrivora, Saurenchelys, 663
candidus, Stromateus, 246, 247
caninus, Gobius, 288
caninus, Gobius, 288
canio, Callichrous, 477
canio, *Silurus*, 476
canius, *Cyprinus*, 577
canius, Plotosus, 482
canius, *Systomus*, 577
Cannorhynchus, 360
CANTHARINA, 132
Canthidermis, 686
Cantor, Dr., iii
Cantoria, 431
cantori, Anguilla, 660
cantori, Hemiramphus, 513, 514
cantori, *Johnius*, 190
cantori, Pseudoscarus, 412
cantoris, *Apocryptes*, 302
cantoris, Apocryptichthys, 302
cantoris, Coilia, 630, 631
cantoris, Eleotris, 312
cantoris, Mugil, 350
cantoris, Osteogeniosus, 469
canus, *Pleuronectes*, 429
capense, Scyllium, 724
capensis, Elops, 649
caperata, Eleotris, 315, 316
caperatus, Eleotris, 315
capistratus, Balistes, 689, 691
Capoeta, 550, 556
Caprodon, 27
Caracanthus, 158

carah, Equula, 243
Carangidæ, 210
Carangichthys, 210, 211
Carangoides, 210, 211
Carangops, 210
Carangus, 210
carangus, Caranx, 211, 215
carangus, *Scomber*, 215
Caranx, 210, 211
caraputty, 237
Carassius, 552, 604
carbolic acid, 346
carbunculus, Platycephalus, 278
caree, Ichthyocampus, 679
caree, *Syngnathus*, 679
Carcharias, 710
Carchariidæ, 709, 710
Carchariinæ, 710
carcio, *Pimelodus*, 448
caria, Tetrodon, 703
caribæus, *Chloroscombrus*, 227
carinata, *Scorpæna*, 155
carinatum, *Stegostoma*, 725
carinatus, Apistus, 155
carinatus, Mugil, 346, 349
carinatus, *Pterichthys*, 155
caringanah, 371
caripa, Pristipoma, 74
caripe, *Perca*, 74
caris, *Chætodon*, 415
carnarensis, Etroplus, 414
carnaticus, Aplocheilus, 522
carnaticus, Barbus, 557, 563
carnaticus, *Cobitis*, 610
carnaticus, *Pimelodus*, 495
carnaticus, *Puntius*, 563
carnaticus, *Systomus*, 573
carnea, Trygon, 739
carolina, *Argentina*, 649
caroui, *Mesoprion*, 35
carouna, *Corvina*, 192
Carps, xv, 524
cart-kana, 50
carutta, *Johnius*, 192, 193
carutta, Sciæna, 192
cascasia, Mugil, 347, 355
cashi mara, 415
castaneoides, Plotosus, 483
castaneus, Plotosus, 483
catalea, *Corvina*, 189
cataleus, *Johnius*, 189
Cataphracti, 279
catebus, Gobius, 295
catenata, Muræna, 669
catenula, *Labrus*, 141
Cat fishes, 438
Catla, xv, 553, 604
catla, 553
catla, *Cyprinus*, 553
catla, *Leuciscus*, 553
Catochænum, 96
Catophracti, 274
Catophorhyngue, 699
Catopra, 127, 130
catus, *Coius*, 42, 43
caudatus, *Gonorhynchus*, 527
caudatus, *Lobocheilos*, 528
caudatus, *Macrognathus*, 340, 341
caudalus, *Ophisurus*, 664
caudatus, *Squalus*, 726
caudimaculata, Belone, 512
caudimaculata, Percis, 263
caudimaculatum, Holocentrum, 172
caudimarginatus, Barbus, 560
caval sorrah, 715
cavasius, *Bagrus*, 447
cavasius, *Hypselobagrus*, 447
cavasius, Macrones, 443, 447
cavasius, *Pimelodus*, 447
caverii, *Leuciscus*, 584
cavia, *Bagarius*, 499
cavia, Glyptosternum, 496, 499
cavia, *Pimelodus*, 499
cavifrons, Eleotris, 313
celebensis, Anguilla, 660
celebica, *Corvina*, 185
celebica, Novacula, 402
celebicus, Acanthurus, 206
celebicus, *Epinephelus*, 22
celebicus, Gobius, 289
celebicus, *Johnius*, 185
celebicus, Julis, 404
celebicus, Serranus, 22
cenia, 492
cenia, *Hemipimelodus*, 492
cenia, Gagata, 492
cenia, *Pimelodus*, 492
centiquadra, *Hemitauloga*, 399
centiquadrus, *Labrus*, 399
Centrarchini, 127
Centriscidæ, 361
Centrogaster, 165
Centrogobius, 282
Centropogon, 155
Centropus, 158
Centrurophis, 663
centurio, Diagramma, 83
centurio, Lethrinus, 136
cepedianus, Gomphosus, 406
Cephalocassis, 456
Cephalogobius, 282
Cephalopholis, 8, 9
Cephaloptera, 744, 745
Cephaloscyllium, 724
cephalotus, Mugil, 350, 353
cephalus, *Labeo*, 546
cephalus, Osteocheilus, 545, 546
cephalus, Mugil, 350, 353
Cepola, 324
Cepolidæ, 324
ceramensis, *Amia*, 65
ceramensis, Apogon, 65
ceramensis, Gobiodon, 298
ceramensis, *Gobius*, 297
Ceratacanthus, 692
Ceratoptera, 742, 745
Ceratascopelus, 506
Cerna, 8
Cestracion, 719
Cestrorhinus, 719
ceylonensis, Callichrous, 477
ceylonensis, *Eustira*, 599
ceylonensis, *Garra*, 528
ceylonensis, *Julis*, 400
ceylonensis, Mugil, 358
ceylonensis, Perilampus, 598, 599
ceylonensis, Syngnathus, 677, 678
ceylonensis, Platyglossus, 400
Ceylon, Fishes of, iii
,, sub-region of, xiii
chaandcha, 17
Chaca, 441, 481
chaca, *Calliomorus*, 276
chaca, *Platystacus*, 481
chacca, Platycephalus, 276
chacunda, Chatoessus, 632, 633
chacunda, *Clupanodon*, 632
chacunda, *Dorosoma*, 633
chaddu paddaka, 571
chadu perigi, 579
Chænogaleus, 717
Chænopsetta, 422
Chæroichthys, 679
chærojulis, 397
chærops, 390, 391
Chætodermis, 692
Chætodon, 103
Chætodontidæ, 102
Chætodontina, 102, 103
Chætomus, 630
Chæturichthyi, 282
Chæturichthys, 282
chaguni, 559
chagunio, Barbus, 557, 559, 561
chagunio, *Cyprinus*, 559, 560
chagunio, *Rohita*, 559
chah-ti-ing-ud-dah, 120
chak-mud-dah, 385, 387
chal-burn-dah, 190
chalybeata, *Rohita*, 545
chalybeata, *Rohita*, 537
chalybeatus, *Labeo*, 545
chalybeatus, Osteochilus, 545
cha-meen, 568
cha-mo-dah, 701
champil, *Alausa*, 638
champil, Clupea, 639
champil, *Pellona*, 639
Chanda, 49, 96
chandee, 51, 54
chandramara, *Batasio*, 451
chandramara, *Pimelodus*, 451
chandramara, *Pimelodus*, 492
chandramara, *Silundia*, 451
changarah, 92
changua, Apocryptes, 301
changua, *Gobius*, 301
Channinaformes, 624, 651
Channa, xiii, 368, 489
Channomuræna, 674
Chanos, 624, 651
chanos, Chanos, 651
chanos, *Lutodeira*, 651
chanos, *Mugil*, 651
chapalio, *Cyprinus*, 597
chapra, *Alosa*, 640
chapra, *Clupanodon*, 639
chapra, Clupea, 635, 639
chapra, Clupea, 641
chaptis, *Bola*, 189
chaptis, *Johnius*, 189
charl, 584, 589
charlay, 636
charree-addee, 638
chatareus, *Coius*, 117
chatareus, Toxotes, 117
Chatoessiformes, 623, 632
Chatoessus, 623, 632
chava waku, 324
chawa aku, 324
chay-la-ree, 595
chaya-vellachee, 601
chayung, 367
ched-du-ah, 50
chedra, Barilius, 591
chedra, *Cyprinus*, 590
chedra, *Leuciscus*, 590
chedrio, *Cyprinus*, 591
Chedrus, 588
checkra, Callichrous, 477
checkra, *Silurus*, 476
cheeb-ta-ta-dah, 154
cheelahoo, 342
cheerul, 120
cheewoola-parah, 224
Cheilio, 390, 406
Cheilobarbus, 556
Cheilinus, 390, 393
Cheilichthys, 699
Cheilodipterus, 65
Cheilodipterus, 57, 307
Cheilotrema, 184
chela, 598
Chela, xv, 594, 599, 605
chel-hul, 600
chella kassu, 415
chel-lee, 473, 490
chelliah, 603
chelluah, 585
Chelmo, 109
Chelonodon, 699
chelynoides, Barbus, 563
chembolay, 43
chena, 366
chena, Ophiocephalus, 366
chen-da-la, 340
chen-da-lah, 587
chenga, 367
chennuah, 491
chetchua-porah, 549
chid-dul-lu, 583
chilacka-sani-muyya, 403
chilatrasani, 405
childreni, *Ageneiosus*, 487
childreni, Silundia, 487
chilensis, Pelamys, 253
chilinoides, Barbus, 557, 563
Chiloscyllium, 724, 726
chilwa, 585
chin-do-lah, 584
chindrakee, Trygon, 736, 738
chinensis, Sphyræna, 342
chinta, Arius, 460, 465
chinta, *Bagrus*, 460
chinta jella, 460
Chimarrichthys, 501
chippuah, 585
Chirocentridæ, 652
Chirocentrus, 652
chirocentrus, *Esox*, 652
chironectes, 271
Chironecteoidei, 271
chirophthalmus, Dactylopterus, 279
chirtah, *Lutjanus*, 32
chirtah, *Mesoprion*, 32
chirtah, *Sparus*, 32
chitala, 654
chitala, *Mystus*, 654
chitala, Notopterus, 653, 654
chitchillee, *Sparus*, 142
chit-rah-too, 563
chitsilloo, 114
chittahri, 549
chitul, 654
chitul, *Leuciscus*, 555
chloris, *Scomber*, 227
chloropterus, Chanos, 651
Chloroscombrus, 226
chlorostigma, *Chironectes*, 272
chlorostigma, Gobius, 747
chlorostigma, Muræna, 668
chlorostigma, Serranus, 12
chlorostigma, *Thyrsoidea*, 668
chlorurus, Cheilinus, 393, 394
chlorurus, *Sparus*, 393, 394
choaree, 592
choaree verarl, 363
chhotka vachoya, 472
choirocephalus, Monacanthus, 692, 693
choirocephalus, *Paramonacanthus*, 693
Choirodon, 391
choirorrhynchus, Acanthopsis, 608
choirorrhynchus, *Cobitis*, 608
chola, 585
chola, Barbus, 556, 558, 571, 574
chola, *Capoeta*, 571
chola, *Cyprinus*, 571
chola, *Systomus*, 571

CHONDROPTERYGII, 1, 709
Chondroplites, 246
chondropterygius, Arius, 459
Chondrostoma, 550
Chonephorus, 282
Chonerhinus, 699
chood-nuud-dah, 303
choori-min, 252
choram, Belone, 509, 510
choram, *Esox*, 510
choram, *Mastacembelus*, 510
Choridactylus, 161
Chorinemus, 229
chota-bekkut, 84
chota wahlah, 477, 653
chow-ur-dah, 276
chow-lud-dah, 166
christianum, Holocentrum, 173
CHROMIDES, 414
chrysargus, Amphiprion, 379
chrysargyra, Chrysophrys, 142
chrysea, Rita, 454, 455
chryseus, Macrones, 442, 443
chryseus, Nemacheilus, 620
chryseus, *Pseudobagrus*, 443
chrysobalion, Pristipoma, 74
Chrysoblephus, 139
chrysochlora, *Racoma*, 532
chrysochlorus, Schizothorax, 532
Chrysophrys, 138
Chrysophrys, 139
chrysopoma, Barbus, 557, 561, 562
chrysopoma, *Puntius*, 561
chrysopoma, Pseudoscarus, 411, 412
chrysopoma, *Systomus*, 561
chrysopomus, *Scarus*, 412
chrysops, Danio, 595, 596
chrysops, *Leuciscus*, 596
chrysos, Caranx, 215
chrysoptera, *Platessa*, 423
chrysopterus, Balistes, 688
chrysopterus, Barbus, 559, 579, 580
chrysopterus, *Systomus*, 579
chrysospilus, Balistes, 690
chrysostigma, *Leptonurus*, 631
chrysostigmus, Aplocheilus, 523
chrysostomus, *Systomus*, 560
chrysotænia, Apogon, 61
chrysotænia, Lutianus, 36
chrysotænia, *Lutjanus*, 36
chrysotænia, *Mesoprion*, 36, 37
chrysozona, Cæsio, 95, 96
chrysozonus, Scomber, 250
chrysurus, Chætodon, 105, 106, 747
chrysurus, Coryphæna, 248
chrysurus, Micropteryx, 227
chrysurus, *Pomacentrus*, 105
chrysurus, *Scomber*, 227
chuddukun, 110
chumbara kah, 739
chumbum, 255
chuna, *Colisa*, 373
chuna kholisha, 374
chuna, Trichogaster, 373
chuna, *Trichopodus*, 373
chundawah, *Sparus*, 245
chuppa tirike, 742
chutichi, 131
Cibotion, 695
Cichloides, 127
ciga sorrah, 716
ciliaris, Caranx, 223
ciliaris, Caranx, 224
ciliaria, *Citula*, 223
ciliaris, *Zeus*, 97, 224
ciliata, *Kuhlia*, 67
ciliata, *Perca*, 67
ciliata, *Percichthys*, 67
ciliatus, *Holocentrus*, 89
ciliatus, *Moronopsis*, 67
ciliatus, Scolopsis, 89
cincta, Pterois, 154
cincticauda, *Cobitis*, 619
cincticauda, Nemacheilus, 613, 619
cinctum, Diagramma, 81
cinctus, Balistes, 691
cinerascens, Diagramma, 83
cinerascens, Muræna, 671
cinerascens, Pimelepterus, 143
cinerascens, *Sciæna*, 143
cinerascens, Synaptura, 429
cinerea, *Acoura*, 616
cinerea, *Aluteria*, 693
cinerea, *Muræna*, 662
cinereus, Lethrinus, 135
cinereus, Murænesox, 661, 662
cinereus, Monopterus, 656
cinereus, *Stromateoides*, 247
cinereus, Stromateus, 246, 247
cinereus, Therapon, 70, 71
cingulata, Julis, 404
cingulum, *Julis*, 408
cingulum, Coris, 408
cinnabarinus, Upeneus, 126
cinnamomea, *Cobitis*, 610
cinnamomea, *Pangio*, 610
cirratus, *Amblyopus*, 318
cirratus, Gobioides, 318
cir-re-oh, 537
cirrhata, *Shacra*, 590
cirrhatus, Hemiramphus, 516
cirrhatus, *Opsarius*, 590
Cirrhimuræna, 664
Cirrhina, 547, 604
Cirrhisomus, 699
Cirrhites, 144
Cirrhitichthys, 145
CIRRHITIDÆ, 144
Cirrhitopsis, 145
cirrhosa, Caranx, 223
cirrhosa, Cirrhina, 547
cirrhosa, *Perca*, 150
cirrhosa, *Scorpæna*, 150
cirrhosa, Scorpænopsis, 150
cirrhosus, *Cyprinus*, 547, 560
cirrifer, Monacanthus, 693
Cirrimens, 181
cirrosus, *Squalus*, 725
Citharichthys, 421, 422
citrinus, Gobiodon, 298
citrinus, *Gobius*, 298
citrinus, *Pseudogobiodon*, 298
citula, *Carangoides*, 223
citula, Caranx, 223
Clara, 101
Clarias, 391, 439, 441, 483
clarkii, Amphiprion, 377, 378, 379
clarkii, *Prochilus*, 379
clavatus, Barbus, 557, 560
Clupalosa, 634
Clupanodon, 634
Clupea, 623, 634
Clupeæformes, 623, 634
Clupea, with accessory breathing organs, 634
Clupeichthys, 642
CLUPEIDÆ, 438, 623
Clupeoides, 634, 642
clupeoides, Chela, 600, 602, 603
clupeoides, *Cyprinus*, 602
clupeoides, *Leuciscus*, 602
Clupeonia, 634
Clupisoma, 470
clypeaster, Arius, 459
clypeastroides, Arius, 459
clypeata, Echeneis, 258
coal-arinza-candee, 543
coatee candee, 563
COBITIDINA, 605
Cobitis, 609
cobojius, *Cojus*, 370
coccinea, *Diacope*, 43
cochinchinensis, Silurus, 480
cochinensis, *Crayracion*, 704
cochinensis, Glyphidodon, 385, 386
cochinensis, Thynnichthys, 554
cock-up, 7
coco-meen, 512
coco mottah, 506
Cocotropus, 159
cocsa, *Barbus*, 590
cocsa, Barilius, 590, 591
cocsa, *Chedrus*, 590
cocsa, *Cyprinus*, 590
cocsa, *Leuciscus*, 590
cod, black rock, 141
Codfish, ova of, 417
cognatus, Uranoscopus, 260
coi, 370
coibor, *Bola*, 188
coii-bola, 194
coila, Ailia, 488, 489
coila, *Malapterurus*, 488
Coilia, 623, 630
coilia, 374
coilia, *Ramcarati*, 631
coioides, *Bola*, 19
coioides, Serranus, 19
coitor, *Bola*, 187
coitor, *Corvina*, 187
coitor, *Johnius*, 187
coitor, Sciæna, 187
Coius, 7
Colisa, 373
colisa, *Trichopodus*, 374
collaris, Chætodon, 107, 108
collection of fish how formed, ii
collee-aringean-candee, 562
Collia, 630
Collichthys, 193
colloose, 537
coloratus, Salarias, 332
colours, how affected, 6
colours in Diagramma, 77
colubrina, *Muræna*, 665
colubrina, Muræna, 669
colubrina, *Ophithorax*, 665
colubrina, *Thyrsoidea*, 669
colubrinus, *Gymnothorax*, 665
colubrinus, Ophichthys, 664, 665
colubrinus, *Ophisurus*, 665
coma, Equula, 239
coma, *Equula*, 244
come, Chatoessus, 634
comes, Hippocampus, 682
commaree, 18
commersoniana, *Brachirus*, 428
commersoniana, *Solea*, 428
commersoniana, Synaptura, 428
commersonianus, Engraulis, 624, 629
commersonianus, *Pleuronectes*, 428
commersonianus, *Stolephorus*, 629
commersonii, Ambassis, 52, 53
commersonii, Ambassis, 53
commersonii, Antennarius, 271
commersonii, Arius, 457
commersonii, Cybium, 255
commersonii, Engraulis, 629
commersonii, Fistularia, 360
commersonii, Gomphosus, 406
commersonii, Hemiramphus, 516
commersonii, *Labrus*, 74
commersonii, Pristipoma, 74
commersonii, Psettus, 234
commersonii, *Scomber*, 255
commersonii, Sphyræna, 342, 343
commersonii, Tetrodon, 705
compressus, Barbus, 558, 570
compressus, Caranx, 221
compressus, *Nauclerus*, 229
conagga, *Chætodon*, 204
concatenata, Teuthis, 167
concatenatus, *Amphacanthus*, 167
conchonius, Barbus, 559, 576
conchonius, *Cyprinus*, 576
conchonius, *Systomus*, 577
conchonius, *Systomus*, 576
concolor, Ginglymostoma, 725
conductor, *Centronotus*, 229
confertus, Serranus, 14
Congerodon, 661
Congromuræna, 658, 660
conirostre, Glyptosternum, 496, 497
conirostris, Barbus, 563
conirostris, Ptycobarbus, 533
Conorhynchus, 648
conorhynchus, Albula, 648, 649
conspicillum, Balistes, 688
conspicillum, Balistes, 686, 689
conspicillum, *Rhinecanthus*, 689
conta, Erethistes, 498, 452
conta, *Hara*, 453
conta, *Pimelodus*, 453
coompoo, 74
coon-che-li-e, 598
coondallum, 292
coor-cur-riah, 482
coori, 639
cooroowa, 190
coorrie, 140
Copidoglanis, 482
coplah, 512
Coracinas, 184
Coracinus, 377
corake, 74
corallia, 415
corallicola, *Epinephelus*, 20
corallicola, Plesiops, 128
corallicola, Serranus, 20
cordyla, *Trachurus*, 215
Corica, 623, 642
corica, *Cobitis*, 616
corica, Nemacheilus, 613, 616
Coris, 390, 407
coris, *Julis*, 408
Corniger, 170
cornuta, *Æsopia*, 430
cornuta, *Solea*, 430
cornuta, Synaptura, 428, 430
cornutus, *Chætodon*, 111
cornutus, Kurtus, 174
cornutus, *Lactophris*, 697
cornutus, Ostracion, 695, 697
cornutus, Zanclus, 111
coromandelicus, Serranus, 746
coroua, 74
corsula, 354
corsula, Macrones, 443, 446, 447
corsula, Mugil, 347, 354
corsula, *Pimelodus*, 446
cortius, Chatoessus, 633
cortius, *Clupanodon*, 633
corungan sorrah, 725, 726
corutchi, Etroplus, 415

Corvina, 184
Coryphæna, 248
coryphænula, *Gobius*, 298
Coryphænidæ, 248
Corythobatus, 159
Corythoichthys, 677
cosmopolita, *Chloroscombrus*, 227
cosmopolita, *Seriola*, 227
Cossyphodes, 391
Cossyphus, 390, 391
Cossyphus, 483, 391
Costa, 661
cosuatis, Barbus, 559, 581
cosuatis, *Cyprinus*, 581
cosuatis, *Leuciscus*, 581
cotio, *Cyprinus*, 587
cotio, *Osteobrama*, 587
cotio, Rohtee, 586, 587
cotis, *Abramis*, 587
cotis, *Leuciscus*, 587
cotis, *Osteobrama*, 587
cotra, *Colisa*, 374
cotra, *Trichopodus*, 374, 375
Cottidæ, 274
Cottini, 148
Cottini, 274
Cotton, Sir Arthur, i
Cotylopus, 298
courie, 537
cowlie, 597
crapao, Serranus, 19
crassi kola, 694
Crassilabrus, 393
crassispina, *Plectorhynchus*, 78
crassispinum, Diagramma, 78
Crayracion, 699
Crenidens, 132
crenidens, *Sparus*, 133
crenilabris, Mugil, 347, 355
crenulatus, Discognathus, 528
crinalis, *Bagrus*, 463
criniger, *Acronurus*, 209
criniger, Gobius, 288
cristatus, *Euctenogobius*, 291
cristatus, Gobius, 291
crocodila, Belona, 510
crocodile fishes, 274
crocodiles' teeth, 679
crocodilus, Belone, 510
Cromileptes, 8
Crossochilus, 547
Crossoderma, 158
Crotalopsis, 664
crozieri, Trygon, 739
crucigera, Rita, 454
crumenophthalmus, Caranx, 217, 218
crumenophthalmus, *Scomber*, 217
Cryptocentrus, 282
Cryptopterus, 475
Cryptosmilia, 115
Ctenodon, 202
Ctenodon, Acanthurus, 207
Ctenogobius, 282
Ctenolabridæ, 377
ctenolepis, *Alosa*, 641
Ctenops, 371
cuaree, 450
cubicus, Ostracion, 695, 696
cucah sawahri, 506
cuchia, 656
cuchia, Amphipnous, 655, 656
cuchia, *Unibranchapertura*, 656
cuck-se, 355
cucura, *Cobitis*, 608
cuggera, 536
cudecrah, 265
cuddul-verarl, 256
cuja, *Bola*, 187
cuja, *Corvina*, 187
cuja, Sciæna, 187
cul cundee, 526
culingah, 265
culim poun, 662
cul-irum, 617
Culius, 309
culius, *Cheilodipterus*, 313
cul-kah-catchee, 173
cul-kilchi, 95
cullawah, 9
cul nahmacunda, 505
cul-pamboo, 677
cul-plaachee, 159, 695
cul-sillandan, 61
cultalli, 232
cultellatus, Platycephalus, 276
cultellus, *Leuciscus*, 603
cultellus, *Pelecus*, 603
cul-toumbi, 164
cultrirostris, *Trachyrhamphus*, 677
cumboo kelletee, 444
cumingii, Barbus, 559, 578
cuneulus, Doryichthys, 679
cuneulus, *Microphis*, 679
cuneulus, *Syngnathus*, 679
cundahla, 415
cun-da-ree, 732
cundinga, *Cyprinodon*, 650
cundinga, *Elops*, 650
cundinga, Megalops, 650
cungur, 512
cuning, Cæsio, 95
cuning, *Cichla*, 95
cuning, *Sparus*, 95
cunnay, 650
cunnesius, Mugil, 346, 349
cunnesius, Mugil, 353
cunnumboo, Mugil, 351
cupanus, Polyacanthus, 371
cura, *Cyprinus*, 542
curavu, 363
curchius, *Cyprinus*, 537
curchius, Labeo, 537
cured fish, xvi
curmuca, Barbus, 557, 566, 567
curmuca, *Cyprinus*, 560, 566
curmuca, *Gobio*, 567
curcoo-moolee candee, 539
currapu-mattawa, 140
curroopoo-voval, 247
currooway tiriki, 743
curru, 548
currudden toaddy, 635
currumay, 42
currumunnee candee, 539
currupu verarl, 366
currutche, 75
cursa, 537
cursa, *Cyprinus*, 537
cursa, Labeo, 537
cursis, *Cyprinus*, 537
cursis, *Rohita*, 537
cursua, 537
curtifilis, Megalops, 650
curvifrons, Schizothorax, 532
cuspidatus, Pristis, 728
cutta, 447
cutcutia, *Leisomus*, 703
cutcutia, *Monotretus*, 703
cutcutia, Tetrodon, 700, 703
cutlah, 190
cut-tah-lee, 75
cuttay-charlay, 638
cuttu pirium, 37
cutturpoh, 577
cutwaal ursi, 642
Cuvier and Valenciennes, iii
cuvier, *Bodian*, 79, 80
cuvieri, Chrysophrys, 141
cuvieri Cirrhinus, 547
cuvieri, Diagramma, 79
cuvieri, *Melapterurus*, 488
cuvieri, Opisthognathus, 266
cuvieri, *Silurus*, 488
cuvieri, Therapon, 70
cuvieri, *Thryssa*, 625
cyanifrons, Novacula, 402
cyanifrons, *Xirichthys*, 402
cyanochloris, Cheilio, 407
cyanogaster, Julis, 405
cyanopterum, Solenostoma, 676
cyanophthalmus, Haplochilus, 522
cyanophthalmus, *Panchax*, 522
cyanomos, *Acentrogobius*, 287
cyanomos, Gobius, 287
cyanospilos, Syngnathus, 677, 678
cyanospilus, Pomacentrus, 384
cyanostigma, Scorpæna, 148, 747
cyanostigma, Serranus, 24
cyanostigmatoides, *Epinephelus*, 24
cyanostigmatoides, Serranus, 24
cyanotænia, *Devario*, 595
cyanurus, *Scarus*, 411
Cybium, 254
Cyclocheilichthys, 556
Cyclolabridæ, 390
Cyclogobius, 282
cyclops, *Salarias*, 326
cyclostoma, Upeneus, 125
cyclostomus, *Rhina*, 730
cylindrica, Belone, 510
cylindrica, Percis, 263
cylindricus, Mugil, 355
cylindricus, Serranus, 14
Cymolutes, 390, 408
Cynocephalus, 710
cynodon, Petroscirtes, 327
cynoglossa, *Icania*, 436
cynoglossa, *Plagusia*, 436
cynoglossus, 421, 431
cynoglossus, *Achirus*, 436
Cynoponticus, 661
Cynoscion, 195
Cyprinidæ, xiv, xv, 438, 524, 603
Cyprinodon, 521
Cyprinodontidæ, 438, 521
Cyprinodontidæ carnivoræ, 521
Cyprinodontidæ limnophagæ, 521
cyprinoides, *Blennechis*, 328
cyprinoides, *Clupea*, 602
cyprinoides, *Clupea*, 650
cyprinoides, Megalops, 97, 650, 651
cyprinoides, *Omobranchus*, 328
cyprinoides, Petroscirtes, 326, 328
Cypsilurus, 518
Cyrene, 546, 547

da-bah, 595
dacer, Equula, 240
dacer-karah, *Zeus*, 240
Dactylopterus, 279
dadong, Trygon, 738
dahwiee, 584
dah-rah, 590
dal, 536
Dalophis, 663
damba, 17
dancena, *Cyprinus*, 598
dandia, *Leuciscus*, 584
Dandia, Rasbora, 584
dangara, 7
Dangila, 546, 604
Dangila, 547
dangila, *Cyprinus*, 596
dangila, Danio, 595, 596
dangila, *Nuria*, 596
daniconius, *Cyprinus*, 584
daniconius, *Leuciscus*, 584
daniconius, Rasbora, 583, 584
daniconius, *Opsarius*, 584
danikoni, 584
Danio, 588, 594, 605
dankena, 598
dannahrah, 598
danius, *Atherina*, 316
danius, Eleotris, 316
danrica, 583
danrica, *Cyprinus*, 583
danrica, *Esomus*, 583
danrica, Nuria, 583
dara, 179
darangi, 560
dario, Badis, 129
dario, Botia, 606
dario, *Cobitis*, 606
dario, *Labrus*, 129
dario, *Schistura*, 606
Dascyllus, 380
Dasyscopelus, 506
Datnia, 71
Datnia, 68
datnia, Chrysophrys, 375
datnia, *Coius*, 140
datnia, Chrysophrys, 140, 141
Datnioides, 96
daura, Equula, 240
davidi, Exostoma, 501
dayi, Ambassis, 54
dayi, *Epinephelus*, 746
deanii, Hippocampus, 682
debari, 595
decacanthus, Cheilinus, 393
Decapterus, 210, 211
Decaptus, 228
decemlineata, *Diacope*, 46
decussatus, Chætodon, 105
decussatus, *Ichthycallus*, 399
decussatus, *Julis*, 399
decussatus, Lutianus, 47
decussatus, *Lutjanus*, 47
decussatus, *Mesoprion*, 47
decussatus, *Sparus*, 399
deddi jellah, 467
dekkanense, Glyptosternum, 496
dekayi, *Isuropsis*, 722
delicatulus, Lactarius, 245
deliciosus, Barbus, 560
delisianus, Acanthurus, 203
denisonii, Barbus, 558, 573
denisonii, *Labeo*, 573
denisonii, Nemacheilus, 613, 617, 618
denisonii, *Puntius*, 573
dentatus, Apocryptes, 301
dentatus, Boleophthalmus, 306
dentele, *Squale*, 726
Dentex, 89
Dentex, 90
dentex, *Clupea*, 652
dentex, *Equula*, 244
dentex, *Hippoglossus*, 422
denticulata, Ambassis, 55
deocata, Doryichthys, 679, 680
deocata, *Microphis*, 680
deocata, *Syngnathus*, 680
Dermatogenys, 512
dermochirus, Serranus, 21
dero, *Cyprinus*, 540
dero, Labeo, 535, 748
desjardinii, Acanthurus, 207, 208
deux-tubercles, Ostracion, 696
Devario, 594
devario, *Cyprinus*, 595

devario, Danio, 594, 595
devario, *Leuciscus*, 595
devario, *Perilampus*, 595
dewi-koraleyah, 114
dheri dhok, 367
dheri murl, 366
dhoalee, 368
dhonganu, 474
di, 536
Diacanthus, 606
diacanthus, *Chætodon*, 113
diacanthus, Holacanthus, 113
diacanthus, *Johnius*, 189
diacanthus, *Lutjanus*, 189
diacanthus, *Pseudosciæna*, 189
diacanthus, Sciæna, 189
diacanthus, Serranus, 17
Diacope, 29
diacopeformis, Serranus, 19
diadema, Holocentrum, 171
diadematus, Anampses, 395
Diagramma, 77
diagramma, *Anthias*, 82
diagramma, *Perca*, 78
diana, Cossyphus, 392
diana, *Labrus*, 392
diaphina, *Silonia*, 451
Diapterus, 96
Dicerobatis, 742, 744
didactyla, *Scorpæna*, 160
didactyla, *Synanceia*, 161
didactylum, Pelor, 160
diffusa, Chela, 601
diffusus, *Pelecus*, 601
digitata, *Scorpæna*, 161
di-hee, 536
Dilobomycteré, 699
Dillonia, 550
dimidiatus, *Cossyphus*, 393
dimidiatus, Labroides, 393
dimmon, 477
dinnawah, 532
Diodon, 698, 708
Diphreutes, 110
Diplocheilichthys, 534
Diplocheilus, 534
diplochilus, *Barbus*, 548
diplocheilus, *Crossocheilus*, 548
diplogramme, Ophiocephalus, 365
Diplogrammus, 321
Diplolepis, 184
Diplophysa, 612
Diploprion, 28
diplostomus, Labeo, 542
diplostomus, Labeo, 535, 540
diplostomus, *Varicorhinus*, 540
Dipnoids, 709
Diproctacanthus, 392
dipterygia, Astrape, 734
dipterygia, *Narcine*, 734
dipterygia, Plagusia, 431
dipterygia, *Raja*, 734
dipterygia, *Torpedo*, 734
Diptychus, 534, 604
dipus, Periophthalmus, 303
Dischistodus, 384
Discognathichthys, 527
Discognathus, 527, 534, 548, 603
dispar, Cynoglossus, 432, 434
dispar, Cyprinodon, 521
dispar, Hemiramphus, 513, 517
dispar, *Lebias*, 521
dispar, Serranus, 22
dispar, *Zenarchopterus*, 517
displurus, *Mullus*, 125
displurus, Upeneus, 125
dissutidens, *Chelichthys*, 703
dissutidens, Tetrodon, 703
ditchela, Pellona, 642, 644
ditchellee, 644
ditchoa, Pellona, 644, 645
ditchoee, 644
dizona, Muræna, 673
djambal, Pangasius, 470
djarong, Syngnathus, 678
djeddaba, Caranx, 218
djeddaba, *Scomber*, 218
djeddensis, *Rhinobatus*, 731
djeddensis, Rhynchobatus, 730, 731
djiddensis, *Raja*, 730
djidsensis, *Rhinobatus*, 731
doarrah, 367
dobsoni, Barbus, 558, 568
dodecathanthoides, *Mesoprion*, 35, 36
dodecacanthus, Lutianus, 29, 33
dodecacanthus, *Lutjanus*, 33
Dog fishes, 724
doh-ni-ko-nah, 584
dolfyn, Coryphæna, 248
doliata, *Gymnomuræna*, 673
Dolphins, 248
dommarci-batta, 542
domina, *Sillaginopsis*, 264
domina, Sillago, 264, 747
dondoo paum, 656
doondiawah, *Sparus*, 42, 43
dood-ka-mal, 113
dorab, Chirocentrus, 652
dorab, *Clupea*, 652
dorado, Coryphæna, 248
Dormitator, 309
doroides, Arius, 461
doroides, *Bagrus*, 461, 462
Dorosoma, 632
dorsalis, *Amphacanthus*, 168
dorsalis, Barbus, 524, 558, 573
dorsalis, Chætodon, 108
dorsalis, *Corvina*, 185
dorsalis, Julis, 403
dorsalis, *Pastinaca*, 738
dorsalis, *Systomus*, 573
dorsalis, Teuthis, 168
dorsovittatus, *Arothron*, 707
Doryrhamphus, 676
Doryrhamphus, 679
Doryichthys, 676, 679
dotondi, 539
dowlah, 363
doya, 473
dracæna, *Apistus*, 156
dracæna, Gymnapistus, 156
dracæna, *Prosopodasys*, 156
dracæna, *Trichosomus*, 156
draco, *Cataphractus*, 280
draconis, Pegasus, 280
draco, Pegasus, 280
Dragonets, 321
Drepane, 115
drepanis, Trachinotus, 234
dromadaire, Ostracion, 695
dubius, Barbus, 557, 562
dubius, Cynoglossus, 432, 435
dubius, Pristis, 729
dubius, *Puntius*, 562
ductor, *Gasterosteus*, 229
ductor, *Scomber*, 229
ductor, Naucrates, 229
duda, Callichrous, 477
duda, *Silurus*, 476
duhameli, *Rhinobatus*, 731
duh-rie, 587, 595
Duka, Dr., vi
duka dumu, 477
dukai, Barbus, 557, 564
dukai, Silurus, 481
Dukhun, Fishes of, iv
Dules, 67
dulloonga, 368
dum-bra, 538
dumerilii, *Entelurus*, 680
dumerilii, Nerophis, 680
dun-da-nce, 712
dun-de-a, 140
dunguda-porah, 542
dunnahree, 602
duodecimalis, Atherina, 344, 345
durhie, 560
durru, 580
durruah, 7
Dussumieria, 623, 647
Dussumieriæformes, 623, 647
dussumieri, Acanthurus, 206
dussumieri, Ambassis, 54
dussumieri, Arius, 458, 467
dussumieri, Batrachus, 269, 270
dussumieri, Boleophthalmus, 305, 306
dussumieri, Carcharias, 711, 714
dussumieri, *Chanda*, 54
dussumieri, Cirrhina, 549
dussumieri, *Cirrhinichthys*, 549
dussumieri, *Cirrhinus*, 538
dussumieri, Clarias, xiii, 484
dussumieri, Coilia, 630, 631
dussumieri, *Corvina*, 188
dussumieri, Engraulis, 624, 627
dussumieri, Equula, 239
dussumieri, *Gobio*, 549
dussumieri, *Halichœres*, 399
dussumieri, Hemiramphus, 515
dussumieri, *Johnius*, 188
dussumieri, *Julis*, 399
dussumieri, Labeo, 535, 538
dussumieri, *Leuciscus*, 602
dussumieri, Mugil, 347, 352
dussumieri, Mugil, 350, 352
dussumieri, *Pimelepterus*, 143
dussumieri, Platyglossus, 397, 399
dussumieri, Pristipoma, 75
dussumieri, *Rohita*, 538
dussumieri, Salarias, 329, 333
dussumieri, *Sciæna*, 183
dussumieri, Sciæna, 192
dussumieri, Seriola, 228
dussumieri, Sphyræna, 342
dussumieri, Umbrina, 183
duvancelli, Barbus, 560
duvancellii, *Chondrostoma*, 543
duvancellii Leuciscus, 579, 587
duvancellii, *Rohita*, 538
dux, *Chætodon*, 113
dux, Holacanthus, 113
dyocheila, *Cirrhina*, 540
dyocheilus, *Cyprinus*, 540
dyocheilus, Labeo, 535, 540
dystomus, *Leuciscus*, 584

ea-de, 678
ea-ole-jo-do-dah, 379
écharpe, *Baliste*, 691
Echeneidina, 257
Echeneis, 257
Echeneoidei, 250, 257
Echidna, 667
echidna, *Gymnothorax*, 673
echinata, *Tetraroge*, 159
echinatus, Cocotropus, 159, 160
echinatus, *Corythobatus*, 159
Echiopsis, 664
ectunctio, *Esox*, 517
ectunctio, Hemiramphus, 513, 517
edeniana, Schizothorax, 531
edentula, Equula, 238, 239, 244
edentulus, *Leiognathus*, 239
edentulus, *Scomber*, 238
eelemose, 549
eels, cuchia, 655
eel tenkee, 743
eeltenkee, *Myliobatis*, 743
eel, thorny-backed, 340
eesputti, 114
egertonii, Callichrous, 479
ehrenbergi, Carcharias, 717
ehrenbergii, *Ceratoptera*, 745
ehrenbergii, Lethrinus, 137
ehrenbergii, Platax, 236
einthovenii, Rasbora, 584
ekala, Caranx, 215
ekala-parah, Scomber, 215
Elacate, 256
elang, 584
elanga, *Bangana*, 748
elanga, *Cyprinus*, 584
elanga, *Leuciscus*, 584
elanga, Rasbora, 583, 584, 748
Elapsopis, 664
ELASMOBRANCHII, 1, 709
Elastoma, 27
electricus, Tetrodon, 707
elegans, Gobius, 293
elegans, *Julis*, 400
elegans, *Paradanio*, 598
elegans, Saurus, 504
Eleotriformes, 281
Eleotrii, 281
Eleotrini, 281
Eleotriodes, 309
Eleotris, 309
ELEUTHEROBRANCHII, 1
Eleutheronema, 176
elingulatus, *Leuciscus*, 590
Elliot, Sir Walter, v
ellioti, Apogon, 63
ellioti, Carcharias, 711, 716
ellioti, Trygon, 737
ellipticus, *Lutjanus*, 85
elongata, *Alosa*, 643
elongata, Erethistes, 452
elongata, *Hara*, 453
elongata, *Ilisha*, 643
elongata, Pellona, 642, 643
elongata, Solea, 425, 426
elongatus, *Aulopus*, 504
elongatus, Cynoglossus, 432, 433
elongatus, Polycaulis, 164
elongatus, *Trachicephalus*, 164
elongata, *Synanceia*, 164
Elops, 624, 649
Elopsæformes, 624, 649
elopsoides, Dussumieria, 647, 648
elphinstonei, Anguilla, 659
emarginatus, Blennius, 326
endekatænia, *Amia*, 59
endekatænia, Apogon, 59, 746
endrachtensis, Platycephalus, 276
engeli, Mugil, 352
engeli, Mugil, 349
Engrauliformes, 623, 624
Engraulis, 623, 624
Engraulis, poisonous as food, 626
enneacanthus, *Labrus*, 394
enneacanthus, *Mesoprion*, 46
Enneacentrus, 8, 9
enneadactylus, *Pomacanthus*, 87
enceladus, *Chætodon*, 110
ensifera, Equula, 238

ensis, *Xiphias*, 198
Entelurus, 680
Enteromius, 556
Entomacrodus, 328
ephippium, Amphiprion, 377, 378
ephippium, *Lutjanus*, 378
Epibulus, 390, 394
Epinephelini, 8
Epinephelus, 8, 9
Ephippus, 115
Equula, xvi, 237
equula, *Centrogaster*, 238
equula, Gerres, 99
equula, *Scomber*, 238, 243
equulus, *Cæsio*, 238
erate, Lobotes, 84
eregoodoo, *Cephaloptera*, 744
eregoodoo, Dicerobatis, 744
eregoodoo-tenkee, *Cephaloptera*, 744
Erethistes, 440, 452
Erotelis, 309
erumei, *Hippoglossus*, 422
erumei, *Pleuronectes*, 422
erumei, *Psettodes*, 422
erumi naak, 428
eruttum-corah, 75
Erychthys, 395
erythræa, Sillago, 265
erythræus, Serranus, 25, 26
erythræus, *Holocentrus*, 15
erythreus, *Ptyobranchus*, 666
erythrina, *Diacope*, 32
Erythrinus, 489
erythrinus, *Mesoprion*, 32
erythrinus, *Sparus*, 40
erythrocheilus, Albula, 649
Erythrodon, 686
erythrodon, Balistes, 687, 692
erythrodon, Pseudoscarus, 411, 413
erythrodon, *Scarus*, 413
erythrogaster, Cæsio, 95
erythrogaster, Julis, 405
erythrogaster, *Odontonectes*, 95
erythronemus, Periophthalmus, 304
erythrophaios, *Gobion*, 297
erythrophaios, *Gobius*, 297
erythropteron, Balistes, 691
erythropterus, Lutianus, 29, 31, 32, 746
erythropterus, *Lutjanus*, 35
erythropterus, *Mesoprion*, 32
erythropterus, *Mesoprion*, 35
erythrospilus, Gobiodon, 298
erythrurus, *Cichla*, 100
erythrurus, Lethrinus, 137
erythrurus, Serranus, 18
erythrurus, *Sparus*, 99, 100
esculentus, Lethrinus, 136
esocinus, Schizothorax, 532, 533
Esomus, 582
Esunculus, 658
etaapee, *Mesoprion*, 46
étoilé, *Baliste*, 687
étoilé, Tetrodon, 705
Etroplus, xiii, 414
ettee, 726
Euchoristopus, 303
Eucinostomus, 96
Euctenogobius, 282
Eucyclogobius, 282
Englyptosternum, xiii, xiv, 442, 499
Eugobii, 282
Eulamia, 710
Euleptorhamphus, 512
eurychasma, *Symbranchus*, 656
Euryglossa, 428
Eurymyctera, 667
Eurypleura, 428
Euschistodus, 384
Eusphyrna, 719
Eustira, 598
Eutropiichthys, 441, 489
Eutropius, 470
evezardi, Barilius, 589, 593
evezardi, Nemacheilus, 612, 613
evolans, Exocœtus, 518, 519
Evoplites, 29
eximius, *Halichœres*, 399
Exocœtus, 509, 518
exodentata, Murænesox, 662
exodon, *Bagrus*, 472, 473
exodon, Murænesox, 662
exornatus, *Julis*, 399
Exostoma, xiii, xiv, 442, 498, 501
expansa, Andamia, 336

fœtens, *Laurida*, 504
fœtens, *Salmo*, 504
falcarius, Arius, 458, 463
falcarius, Arius, 464
falcata, *Cyprinus*, 540
falcatus, *Chœtodon*, 116
falcatus, *Cyprinus*, 543
falcatus, Labeo, 540
falcatus, *Lobocheilos*, 540
falcatus, *Scomber*, 234
falcatus, Trachinotus, 234
falciformis, *Monodactylus*, 234
falciformis, Psettus, 234
falcifer, Trachinotus, 234
falcula, Chætodon, 104
far, Esox, 516
far, Hemiramphus, 513, 516
farkharii, Chorinemus, 231
farkharii, Lobotes, 84
fasciata, *Amia*, 60
fasciata, *Catopra*, 131
fasciata, *Clupea*, 243
fasciata, Equula, 243
fasciata, *Gymnomuræna*, 673
fasciata, *Muræna*, 665
fasciata, *Perca*, 15
fasciata, *Raja*, 742
fasciata, *Tautoga*, 396
fasciatum, Sicydium, 299
fasciatum, Stegostoma, 725
fasciatus, Apogon, 60, 746
fasciatus, Apogon, 59, 60
fasciatus, *Blennius*, 330
fasciatus, *Blepharis*, 224
fasciatus, Carcharias, 718
fasciatus, *Chætodon*, 113
fasciatius, Cheilinus, 393, 394
fasciatus, *Cheilinus*, 396
fasciatus, *Cirrhinus*, 570
fasciatus, Cirrhites, 145, 146
fasciatus, *Epinephelus*, 16
fasciatus, *Erpichthys*, 331
fasciatus, *Gymnothorax*, 665
fasciatus, Glyphidodon, 387
fasciatus, *Harpurus*, 204
fasciatus, Hemigymnus, 396
fasciatus, *Labrus*, 396
fasciatus, *Leiognathus*, 243
fasciatus, Lethrinus, 137
fasciatus, *Mullus*, 60, 396
fasciatus, *Ophisurus*, 665
fasciatus, *Opsorius*, 592
fasciatus, *Pisoodonophis*, 665
fasciatus, *Polyacanthus*, 374
fasciatu , Pristolepis, 131
fasciatus, Salarias, 329, 330, 331
fasciatus, *Scarus*, 413
fasciatus, Serranus, 15, 16
fasciatus, *Sparus*, 394
fasciatus, *Sparus*, 386
fasciatus, *Squalus*, 725
fasciatus, Trichogaster, 373, 374, 375
fasciolatus, Saurus, 504
fasciolatus, Upeneoides, 120
faujus, *Lophius*, 273
favoginea, Muræna, 670
favagineus, *Gymnothorax*, 670
favatus, Serranus, 14
feliceps, Eleotris, 311
ferdau, Caranx, 217
ferdau, Caranx, 221
ferdau, *Scomber*, 217
Fiddler fish, 449
filamentosa, *Hara*, 453
filamentosum, *Catochœnum*, 98
filamentosus, Barbus, 29, 556, 559, 582
filamentosus, Barbus, 575
filamentosus, *Cantharus*, 91, 92
filamentosus, *Dentex*, 90, 91, 92
filamentosus, *Diapterus*, 98, 99
filamentosus, Gerres, 97, 98
filamentosus, *Leuciscus*, 582
filamentosus, Megalops, 650
filamentosus, Monacanthus, 693
filamentosus, *Nemipterus*, 91
filamentosus, *Pomacentrus*, 106
filamentosus, *Puntius*, 582
filamentosus, *Scomber*, 224
filamentosus, Synagris, 92
filamentosus, *Systomus*, 582
filigera, Equula, 243
filigera, Pellona, 642, 643
fimbriata, Clupea, 635, 636, 637, 638
fimbriata, Muræna, 667, 670
fimbriata, *Rohita*, 536
fimbriata, *Spratella*, 637
fimbriatus, *Cirrhinus*, 536
fimbriatus, *Cyprinus*, 536
fimbriatus, *Gymnothorax*, 670
fimbriatus, *Gonorhynchus*, 548
fimbriatus, Labeo, 535, 536
fimbriatus, Labeo, 538
Finlayson, Dr., iii
finlaysonii, *Julis*, 397
fish, æstivation of, x
fish, anadromous, x
fish, demand for, xv
fish, dried, xvi
fish eggs swallowed by geese, xiii
fisheries, Inspector General of, ii
fishes, air-bladders of, xv
fishes, air-vessels of, xv
fishes, marine, xv
fishes of Zanzibar, v
fishes of Vizagapatnam, ii
fish, fry of, x
fish, how cured, xvi
fishing implements, xi
fish, market for, xv
fish, migrations of, ix
fish, migratory, x
fish, non-migratory, x
fish, poisonous flesh, 669
fish, respiration of, ix
fish, salt, export of, xvii
fish, with poisonous flesh, 626, 686
Fissilabrus, 392
fissus, Arius, 457
Fistularia, 360
Fistularia, 361
Fistularidæ, 360
fixed engines, xi
flagellum, Ætobatis, 743
flagellum, *Goniobatis*, 743
flagellum, *Raja*, 743
flat-heads, 272
flavescens, Chætodon, 106
flavicauda, *Diacantha*, 606
flavicauda, Sphyræna, 342
flavimarginata, Muræna, 667, 671
flavimarginatus, Balistes, 686, 690
flavimarginatus, *Strophidon*, 671
flavipinnis, *Mesoprion*, 43
flavo-cæruleus, *Epinephelus*, 15
flavo-cæruleus, *Holocentrus*, 15
flavo-cæruleus, Serranus, 15
flavolineatus, *Hypeneus*, 122
flavolineatus, Mulloides, 122
flavolineatus, *Mullus*, 122
flavolineatus, *Upeneus*, 122
flavomarginatus, *Gymnothorax*, 671
flavo-purpuratus, *Cynichthys*, 15
flavo-purpurea, Perca, 15
flavus, *Leuciscus*, 584
fleurieu, *Ostorhinchus*, 61
Flower Parrot, 403
Fluta, 656
fluviatilis, Callionymus, 321, 322
fluviatilis, *Crayracion*, 707
fluviatilis, *Dichotomycterus*, 707
fluviatilis, *Raia*, 738
fluviatilis, Tetrodon, 701, 707
foliacea, *Solea*, 429
foliacea, Synaptura, 429
forcipatus, Balistes, 687
formosa, Coris, 407, 408
formosa, Sciæna, 23
formosus, *Epinephelus*, 23
formosus, Julis, 405
formosus, *Julis*, 407
formosus, *Labrus*, 407
formosus, Serranus, 23, 24
forskalii, Atherina, 344, 345
forskalii, Cheilio, 407
forskalii, Crenidens, 132
forskalii, Crenidens, 133
forskalii, *Glossodus*, 649
forskalii, *Holocentrus*, 15
forskalii, Trygon, 740
forsteri, Albula, 649
forsteri, *Amblycirrhites*, 144
forsteri, Caranx, 216
forsteri, Cirrhites, 144
forsteri, *Grammistes*, 144
forsteri, *Paracirrhites*, 144
forsteri, *Scomber*, 231
fossilis, Saccobranchus, 486, 487
fossilis, *Silurus*, 486
frenata, *Amia*, 58
frenatus, Amphiprion, 377, 378
frenatus, Apogon, 58, 59
frenatus, Balistes, 689
frenatus, *Erpichthys*, 335
frenatus, Heliastes, 389
frenatus, *Pristiapogon*, 58
frenatus, Salarias, 330, 335
Fresh-water fish, geographical distribution of, xii
freycineti, Periophthalmus, 304
freycineti, *Scyllium*, 726
frontalis, Salarias, 330
fronticornis, Naseus, 209
fronticornis, *Naso*, 209
fuliginosus, *Labrus*, 396
fulungee, *Chondrostoma*, 549

fulungee, Cirrhina, 547, 548, 549
fulungee, *Gymnostomus*, 549
fulva, *Diacope*, 34
fulva, *Genyoroge*, 34
fulva, *Perca*, 34
fulvescens, Perilampus, 598
fulviflamma, *Diacope*, 41
fulviflamma, Lutianus, 39, 40, 41, 42
fulviflamma, *Lutjanus*, 42
fulviflamma, *Mesoprion*, 41
fulviflamma, *Perca*, 41
fulviflamma, *Sciæna*, 41
fulvoguttatus, *Carangoides*, 217
fulvoguttatus, Caranx, 217
fulvus, *Holocentrus*, 34
fulvus, Lutianus, 34
funebris, *Gymnothorax*, 671
Furcaria, 388
furcatum, Pristipoma, 73
furcatus, Apogon, 64
furcatus, Exocætus, 518, 519
furcatus, *Grammistes*, 73
furcræa, *Corvina*, 188
furcræa, *Perca*, 188
furcræus, *Pachypops*, 188
furcosus, Dentex, 93
furcosus, *Synagris*, 93
fusca, Apua, 611
fusca, Echeneis, 257
fusca, Eleotris, 313
fusca, *Pœcilia*, 313
fuscatus, Periophthalmus, 303
fuscoguttatus, *Perca*, 22
fuscoguttatus, *Epinephelus*, 22
fuscoguttatus, Serranus, 18, 22, 101
fuscus, Acanthurus, 206
fuscus, *Bagrus*, 445
fuscus, Balistes, 686, 690
fuscus, Cheilio, 407
fuscus, *Culius*, 313
fuscus, Gobius, 294
fuscus, Gomphosus, 406
fuscus, *Labrus*, 404
fuscus, Ophiocephalus, 367
fuscus, Pimelepterus, 143
fuscus, *Pimelopterus*, 143
fuscus, Pseudochromis, 268
fuscus, Salarias, 329
fuscus, Trachinotus, 234
fuscus, *Xyster*, 143
fusiformis, Discognathus, 528
fusiformis, *Eupemis*, 407
fusiformis, *Labrus*, 407

gabonicus, Periophthalmus, 304
gachua, Ophiocephalus, xiv, 362, 363, 367
gad-gud-di, 129
GADIDÆ, 417
Gadoidei, 417
Gagata, 442, 492, 493
gagata, *Callomystax*, 492
gagata, *Pimelodus*, 492
gagi-balah-kera, 316
gahnu, 69
gagora, Arius, 458, 464, 465, 466
gagora, Arius, air-vessel of, 466
gagora, *Pimelodus*, 165
gagoroides, Arius, 462
gagoroides, *Bagrus*, 462
gaimardi, *Epinephalus*, 14
gaimardi, Hemiramphus, 514
gaimardi, *Mesoprion*, 45
gaimardi, Platax, 236
gaimardi, Serranus, 14, 15
Galeocerdo, 710, 718
Gallichthys, 210, 211
gallichthys, *Blepharis*, 224
gollichthys, *Carangoides*, 224
gallinula, Monacanthus, 693
gallus, Caranx, 224, 225
gallus, *Citula*, 224
gallus, *Labrus*, 403
gallus, *Osphromenus*, 403
gallus, *Scarus*, 403
gallus, *Zeus*, 224
gandreechee, 51
gandumenu, 536
gangene, *Batrachoides*, 270
gangene, Batrachus, 270
gangetica, Platanista, xii
gangetica, *Pterocryptis*, 476
gangetica, Silundia, 487, 488
gangetica, *Cryptopterus*, 476
gangeticum, *Chondrostoma*, 549
gangeticus, *Abramis*, 587
gangeticus, Callichrous, 476
gangeticus, Carcharias, 710, 711, 715
gangeticus, Gavialis, xii, xiv
gangeticus, *Squalus*, 715
gangr-gongti, 340
Ganoids, 709
garchum, 244
gardenii, *Centronotus*, 256
gardonides, Barbus, 560
Gar-fish, 509
Garra, 527
garua, Pseudeutropius, 471, 474
garua, *Schilbe*, 474
garua, *Silurus*, 474
Gastrophysus, 699, 701
gastrotænia, Syngnathus, 678
Gastrotokeus, 676, 681
gatensis, Barilius, 588, 589, 592
gatensis, *Leuciscus*, 592
gattorugine, *Blennius*, 330
gaywah, 540
Gazza, 243
gelatinosus, Polynemus, 179
gelius, Barbus, 559, 577
gelius, *Cyprinus*, 577
gelius, *Systomus*, 577
gembra, *Alphestes*, 37
gembra, *Mesoprion*, 38
Geneion, 699
Genicanthus, 111
genivittatus, Julis, 404
Genyonemus, 184
geniguttatus, Lethrinus, 136
geniserra, Pterois, 153
Genyatremus, 72
Genyoroge, 29
Genytremus, 72
geographicus, *Lophius*, 272
geographicus, Serranus, 22, 101
geometricus, Holacanthus, 112
georgii, Hemiramphus, 513, 515
georgii, Hemiramphus, 514
georgii, *Scarus*, 404
gerrardi, Trygon, 737
Gerres, 96
GERRINA, 96
gerroides, Pentaprion, 101
geto, Botia, 606
geto, *Cobitis*, 606
geto, *Schistura*, 606
ghanam, *Holocentrus*, 86
ghanam, *Sciæna*, 86
ghanam, *Scolopsides*, 86
ghanam, Scolopsis, 86
ghebul, Therapon, 69
ghobbam, Pseudoscarus, 411, 412
ghobbam, *Scarus*, 412
ghora-chela, 600
ghora, *Leuciscus*, 600
gibba, *Diacope*, 43
gibba, *Genyoroge*, 43
gibba, *Sciæna*, 43
gibbifrons, *Julis*, 408
gibbosa, Clupea, 638
gibbosa, *Cobitis*, 621
gibbosus, Barbus, 561
gibbosus, Ostracion, 695
gibbosus, *Systomus*, 580
gibbus, Lutianus, 43
gibbus, *Lutjanus*, 43
gibbus, *Mesoprion*, 43
Gibelion, 553
gid, 540
giddah, 540
giddi-kaoli, 560, 563
gid-pakke, 560, 563
gigantea, Belone, 510
gigas, *Chætodon*, 385
gigas, Gerres, 98
giirchee, 340
giirha, 590
gilberti, *Epinephelus*, 13
gilberti, Serranus, 13
gili pungti, 577
gilland, 591
Gillia, 282
Gillichthys, 282
Ginglymostoma, 724, 725
giofredi, Coris, 407
giuris, Gobius, 283, 294, 295, 296
gladius, Histiophorus, 198, 199
gladius, *Istiophorus*, 198
gladius, *Scomber*, 198
glaga, *Amia*, 62
glaga, Apogon, 62
glaga, *Apogonichthys*, 62
glass eels, 658
glaucus, Boleophthalmus, 306
glaucus, Serranus, 22
glaucus, Sciæna, 192
globe fish, 699
Glossamia, 56
glossodon, *Conorhynchus*, 649
glossodonta, Albula, 649
glossodonta, *Argentina*, 649
glossodontus, *Butirinus*, 649
glossodontus, *Elops*, 649
Glossodus, 648
Glossogobius, 282
glyphidodon, Apocryptes, 301
Glyphidodon, 377, 384
GLYPHIDODONTIDÆ, 377
Glyptosternum, xiii, 442, 496
Glyptothorax, 496
gna-man-haing, 732
Gnathanodon, 210, 211
Gnathocentrum, 111
Gnathodentex, 93
Gnathophis, 660
Gnathopogon, 556
Gnathypops, 266
goa-chappi, 50
goal, 186
Gobiichthys, 282
GOBIIDÆ, 281
Gobiiformes, 281
Gobiina, 281
Gobiini, 281
Gobileptes, 299
Gobiobarbus, 534
Gobionichthys, 534
Gobiodon, 297
gobiodon, Gobius, 297
Gobiodontini, 281
Gobioides, 316
Gobioides, 321
gobioides, *Blennius*, 330
gobioides, *Racoma*, 532
gobioides, Schizothorax, 532
Gobiomoroides, 309
Gobiomorphus, 309
Gobionelli, 282
Gobionellus, 282
gobiopsis, 282
Gobius, 282
gochi, 340
god-haee, 642
godla, 477
gogee ramah, 318
gogra, *Phractocephalus*, 455
Gogrius, 454
goha, Barilius, 594
goha, *Bola*, 594
goha, *Cyprinus*, 594
goha, *Opsarius*, 594
gohama, *Crossocheilus*, 548
gohama, *Cyprinus*, 548
golaree, 197
goldmani, *Plectorhynchus*, 79
gollund, 587
gomorah, Equula, 240
gomphodon, *Oxyrhina*, 722
Gomphosus, 390, 405
gongaturi, 516
gongota, *Cobitis*, 608
gongota, Somileptes, 608
goni, 537
goniosoma, Barbus, 557, 562
goniosoma, *Puntius*, 562
gonius, *Cyprinus*, 537
gonius, *Cirrhinus*, 537
gonius, Labeo, 535, 537, 538
gonius, *Rohita*, 537
Gonoproktopterus, 556
Gonopterus, 111
Gonostoma, 632
gonti, 340
gooacherah, 498
gool-goolli, 529
gooloo, 295
goo-loo-wah, 295
goomorah-karah, *Zeus*, 239
goonch, 495
goongwah, 477
goong-wah-ree, 477
goongwaree, *Bagrus*, 471
goongwaree, *Hypophthalmus*, 471
goongwaree, Pseudeutropius, 471
goonta, 587
goorahpoo subbookoo, 677
goorda, 587
gootellah, 542
gora, Chela, 599, 600
gora, *Cyprinus*, 600
goreah, 495
goreensis, Albula, 649
gorissa, 368
gossiporah, 129
gotyla, *Cyprinus*, 527
gotyla, *Garra*, 528
gotyla, *Gonorhynchus*, 528
gotyla, *Lobocheilos*, 528
gourami, *Trichopodus*, 372
gourami, Osphromenus, 372
Govan, Dr., vi
gracilis, *Amblyopus*, 317
gracilis, Barbus, 563
gracilis, Belone, 509
gracilis, Gobioides, 317
gracilis, *Mastacembelus*, 510
gracilis, Muræna, 668
gracilis, Nemacheilus, 613, 621
gracilis, *Opsarius*, 594

gracilis, *Ptyobranchus*, 666
gracilis, *Puntius*, 563
gracilis, *Saurus*, 505
gracillimus, *Hippocampus*, 681
graii, Belone, 511
Grammatorcynus, 251
grammepomus, Gobius, 292
grammica, *Genyoroge*, 46
grammicus, Serranus, 23
grammicus, *Symbranchus*, 656
grammicus, Synagris, 92
Grammistes, 27
grande-tache, *Baliste*, 690
grandinosus, Gobius, 288
grandinosus, Ophiocephalus, 364
grandis, Botia, 607
grandis, *Cobitis*, 607
grandis, *Schistura*, 607
grandispina, *Tetrodon*, 699
granosus, Arius, 459
granulatus, Rhinobatus, 731, 732
grayana, Pellona, 643
Gray, Dr., iii, vii
grayi, Barbus, 570
grayi, *Chedrus*, 590
grayi, Engraulis, 625
gray pomfret, 247
Griffith, Dr., iii, iv
griffithii, Nemachilus, 620
griffithii, Oreinus, 531
grisea, *Thyrsoidea*, 671
griseum, Diagramma, 81
griseum, *Scyllium*, 726
griseum, Sicydium, 747
griseobadia, Muræna, 672
griseobadia, *Thyrsoidea*, 672
griseus, Gobius, 285
griseus, Stromateus, 247
gro-age, 340
gronovianus, *Squalus*, 726
grossa, *Buffichthys*, 162
grossa, *Synanceia*, 162
gros yeux, Pomacentre, 381
ground shark, 710, 715
grumbum, 208
grunniens, *Anthias*, 75
grunniens, Batrachus, 269
grunniens, Batrachus, 270
grunniens, *Cottus*, 269
grunniens, *Perca*, 75
GRYSTINA, 67
guamensis, Dules, 67
guamensis, *Scorpæna*, 150
guamensis, Scorpænopsis, 150
guara, *Scomber*, 213
Guavina, 309
guborni, Corica, 642
gudgutia, *Coius*, 74
gudtha, 129
guentheri, Barbus, 573
guentheri, Julis, 405
guentheri, Nemacheilus, 613, 615
gugani, 579
guganio, Barbus, 559, 579
guganio, *Leuciscus*, 579
guganio, *Cyprinus*, 579
Guiritinga, 456
gulah, 295
gularis, Tetrodon, 703
guliminda, *Cantharus*, 91
guliminda, *Spondyliosoma*, 91, 92
gulio, *Aspidobagrus*, 445
gulio, *Bagrus*, 445
gulioides, *Bagrus*, 445
gulio, Macrones, 442, 445
gulio, *Pimelodus*, 445
gu-nas-si, 49
gundi-parah, Scomber, 216
gundun, 654
guntea, 447
guntea, *Cobitis*, 609
guntea, Lepidocephalichthys, 609
Günther, Dr., v
Güntheria, 397
guntheriana, *Alutera*, 693
güntheri, Mastacembelus, 339, 341
guoraka, *Perca*, 75
guoraka, Pristipoma, 75, 76
guj kari, 609
gurrie, 368
gussir, 18
gutgutia, *Mesoprion*, 74
guthrianus, *Ptyobranchus*, 666
guttata, *Cobitis*, 622
guttata, *Laubuca*, 598
guttata, *Raja*, 743
guttatissimus, Chætodon, 106, 747
guttatus, *Amphacanthus*, 168
guttatus, Barilius, 589, 593
guttatus, *Bodianus*, 24
guttatus, Cheilinus, 393
guttatus, Nemacheilus, 622
guttatus, *Opsarius*, 593
guttatus, Oreinus, 530
guttatus, Perilampus, 598
guttatus, *Scarus*, 412
guttatus, *Scomber*, 255
guttatus, Serranus, 24
guttatus, Serranus, 24
guttatus, Upeneoides, 121
guttatus, Uranoscopus, 260
guttatum, Cybium, 255, 256
guttulatus, Hippocampus, 682
guttulatus, Platax, 236
guttum, Gobius, 294
Gymnapistus, 156
Gymnapistes, 155
Gymneleotris, 309
Gymnetridæ, 376
Gymnetrus, 376
Gymnobutis, 309
gymnocephalus, Ambassis, 54, 55
gymnocephalus, *Lutjanus*, 53, 54
Gymnocranius, 89
GYMNODONTES, 684, 698
Gymnogobiini, 281
Gymnomuræna, 659, 674
Gymnomuræna, 667
Gymnosarda, 253
gymnostethoides, *Carangoides*, 217
gymnostethoides, Caranx, 211, 217
gymnostethus, Caranx, 217
gymnostomus, 550
gymnosus, *Holocentrus*, 15
Gymnothorax, 667

haddaja, Holacanthus, 112
Halælurus, 724
hæmatochir, *Plectorhynchus*, 79
Hæmulonidæ, 5
Hæmulopsis, 72
haffara, Chrysophrys, 142
haffara, *Sparus*, 142
halavi, *Raja*, 731
halavi, Rhinobatus, 731
Halicampus, 677
Halichœres, 395, 407
Halichœros, 397
Halieutæa, 273
Halocypselus, 518
Hamiltonia, 49
hamiltoniæ, Murænesox, 662
hamiltonii, *Apterygia*, 647
hamiltonii, Barbus, 565
hamiltonii, *Bedula*, 129
hamiltonii, *Chætomus*, 631
hamiltonii, Coilia, 631
hamiltonii, Cynoglossus, 432, 436
hamiltonii, *Cyprinus*, 541
hamiltonii, Engraulis, 624, 625, 626
hamiltonii, Engraulis, 625, 627, 631
hamiltonii, *Gobio*, 544
hamiltonii, *Macrognathus*, 340
hamiltonii, Mugil, 347, 354
hamiltonii, *Puntius*, 574
hamiltonii, *Raitaborua*, 666
hamiltonii, *Stolephorus*, 625
hamiltonii, *Trichosoma*, 631
hamiltonii, *Thryssa*, 625
hammonia, Cyprinodon, 521
hamo, *Conger*, 662
Hampala, 556
hampal, Barbus, 571
Hapalogenys, 76
Haplochili, 367
Haplochilus, 521
haplodactylus, Scorpæna, 149, 747
Haploinodotus, 184
Hara, 452
hara, Erethistes, 452
harak, Lethrinus, 137
harak, *Sciæna*, 137
hara, *Pimelodus*, 452
harancha, *Ophisurus*, 664
Hardwicke, General, iii
hardwickii, *Acanthonotus*, 488
hardwickii, *Chloriichthys*, 404
hardwickii, *Clorichthys*, 403
hardwickii, Julis, 403
hardwickii, *Raitaborua*, 666
hardwickii, Sciænoides, 194
hardwickii, *Sparus*, 403
harengula, *Leuciscus*, 555
Harengula, 634
harid, Pseudoscarus, 411
harid, *Scarus*, 412
harid, *Scarus*, 411
Harpe, 391
Harpochirus, 115
Harpodon, 503, 505
Harpurus, 202
hartlaubii, Tetraodon, 702
hassek, *Labrus*, 407
hasseltii, *Anodontostoma*, 633
hasseltii, Caranx, 219
hasseltii, Dussumieria, 647
hasseltii, Salarias, 329, 332
hasseltii, *Scyllium*, 726
hasseltii, *Selar*, 219
hasta, Chrysophrys, 140, 375
hasta, *Dentex*, 141
hasta, *Lutjanus*, 73
hasta, Pristipoma, 73, 74, 746
hasta, *Sparus*, 140
hastata, Rita, 454, 456
hastatus, *Arius*, 456
haumela, *Clupea*, 201
haumela, *Enchelyopus*, 201
haumela, Trichiurus, 201
heberi, Caranx, 216
hebraica, Julis, 403, 404
hebraicus, *Labrus*, 404
heb-bu-ti, 371
heel-gorya, 540
helfrichii, Syngnathus, 678
Heliastes, 377, 388
Helicophagas, 469, 470
Helotes, 72
Helotes, 68
helvolus, Monopterus, 656
Hemiarius, 456
Hemibagrus, 442
Hemibarbus, 556
Hemicaranx, 210, 211
hemichrysos, Cheilio, 407
Hemicoris, 407
Hemigalcus, 710, 717
Hemigobius, 282
Hemigymnus, 390, 395
hemiodon, Carcharias, 711, 714
hemiodon, *Hypoprionodon*, 714
Hemipimelodus, 465, 466, 467
Hemipteronotus, 401
Hemiramphi, 518
Hemiramphus, 509, 512
Hemiramphodon, 512
Hemisciæna, 193
Hemiscyllium, 726
Hemisilurus, 475
hemistictus, Serranus, 24
Hemistoma, 410
Hemitautoga, 397
Hemiulis, 395
Heniochus, 110
henlei, Carcharias, 715
hepatus, 166
hepatus, Acanthurus, 206
hepsetus, Atherina, 344
hepatus, *Teuthis*, 206
heptadactylus, *Holocentrus*, 7
heptadactylus, Polynemus, 177
heptagonum, *Scyllium*, 725
Heptanchus, 723
heptazona, Cheilodipterus, 66
her-bag-gi, 598
hermanniana, *Cepola*, 317
hermannianus, *Amblyopus*, 317, 319
hermannii, *Tænioides*, 317
hermaphrodites, 9
Herpetoichthys, 663
Hetereleotris, 309
heterodon, *Pagrus*, 138
heterodon, Sphærodon, 138
Heterognathon, 90
Heteropneustes, 486
heteropterus, *Alticus*, 336
heteropterus, Salarias, 329, 748
Heterosomata, 421
heterorhina, Solea, 425, 426, 430
heterorhinus, *Soleichthys*, 426
Heterothrissa, 624
heterurus, Trygon, 738
hexacanthus, *Dipterodon*, 61
hexagona, *Lobotes*, 96
hexagonata, *Perca*, 14
hexagonatus, *Epinephelus*, 14
hexagonatus, *Holocentrus*, 14
hexagonatus, Serranus, 14, 746
hexagonolepis, Barbus, 557, 564
Hexanchus, 723
Hexanematichthys, 456
hexanemus, Polynemus, 177, 178
hexastichus, Barbus, 557, 565
hexophthalma, Percis, 263
hexophthalmus, *Parapercis*, 263
higginsii, *Myriosteon*, 728
hijala, *Ophisurus*, 664
Hilsa, 640
himalayanus, Barbus, 563
Himalayan sub-region, xiii

Himantura, 736, 737
Himitrygon, 736
Hindustan sub-region, xiii
hippé, Balistes, 689
HIPPOCAMPINA, 676, 681
Hippocampus, 676, 681
hippos, *Carangus*, 216
hippos, Caranx, 216
hippurus, Coryphæna, 248
hirudo, Acanthurus, 204
hispidus, Antennarius, 271, 272
hispidus, *Chironectes*, 271
hispidus, *Lophius*, 271
hispidus, Tetrodon, 700, 706
Histiophorus, 198
histiophorus, Boleophthalmus, 307
histrio, *Lophius*, 271, 272
histrionica, Botia, 606, 607
hoalius, *Cyprinus*, 599
hober, *Centropomus*, 41
Hodson, Mr. Brian, iii
hodgsonii, *Oreinus*, 532
hodgsonii, Schizothorax, 532
hoedtii, Naseus, 209
hoevenii, *Epinephelus*, 16
hoevenii, *Ilisha*, 644
hoevenii, Pellona, 642, 644
hoevenii, Serranus, 16
hogolenensis, Pomacentrus, 383
Holacanthus, 111
Holanthias,27
Holocentrinæ, 169
Holocentrum, 169, 170
holocentrum, Priacanthus, 746
Holocentrus, 7
HOLOCEPHALA, 709
Hologymnosus, 407
Homaloptera, xiii, xiv, xv, 325, 335, 327, 603
homfrayi, Serranus, 25
Homoprion, 184
honckenii, Tetraodon, 702
hoovina murl, 363
horrida, *Bufichthys*, 162
horrida, *Scorpæna*, 162
horrida, *Synanceia*, 162
horridum, Synancidium, 162
horridus, *Epinephelus*, 22
horridus, Plotosus, 482
horridus, Serranus, 18, 22, 101
Horsfield, Dr., iii
hortulanus, *Halichœres*, 399
hortulanus, *Julis*, 399
hortulanus, *Labrus*, 399
hortulanus,Platyglossus,397,399
Hubrecht, Dr., vii
huddah, 494
hugelii, Schizothorax, 532
hum-catchari, 600
Hume, A. O., Esq., v
hu mcen, 651
humeralis, Eleotris, 315
humilis, Solea, 426
Hurd-wah-re, 354
hyala, Ophichthys, 664
hyalinus, Salarias, 332
hyalosoma, *Amia*, 64
hyalosoma, Apogon, 64
Hymenophysa, 606
hymenophysa, Botia, 607
Hynnis, 210
Hyoprorus, 658
Hypogymnogobius, 282
Hypolophus, 736, 740
Hypoplites, 29
Hypoprion, 710, 711, 713
Hypoprionodon, 710
Hyporhamphus, 512
Hypseleotrini, 281
Hypselobagrus, 442
Hypselobarbus, 534, 553, 556
hypselogenion, *Arothron*, 702
hypselogenion,Tetrodon, 700,702
hypselosoma, Chirocentrus, 652
hypselosoma, Notopterus, 654
Hypsigenys, 391
Hypsipops, 384
hyrtlii, *Halichœres*, 398
hyrtlii, *Julis*, 398
hyrtlii, Platyglossus, 397, 398
hystrix, Diodon, 708
hystrix, Hippocampus, 682, 683
hystrix, *Holocanthus*, 708
hystrix, *Paradiodon*, 708

Icania, 431
Ichthyapus, 663, 664
Ichthyophis, 674
Ichthyocampus, 676, 679
Ichthyscopus, 261
Ictiopogon, 308
ikapor, Plotosus, 483
Ilarches, 115
Ilisha, 642
ilisha, *Clupanodon*, 640
ilisha, Clupea, x, 623, 635, 640, 641
imbricata, *Raja*, 739
imbricata, Trygon, 737, 738
immaculata, *Apterigia*, 656
immaculata, Fistularia, 360
immaculata, *Ophisurus*, 664
immaculata, *Amia*, 649
immaculatus, *Arothron*, 704
immaculatus, Barbus, 560
immaculatus, Calliehrous, 476
immaculatus, *Cannorhynchus*, 360
immaculatus, *Crayracion*, 704
immaculatus, *Dilobomycterus*, 704
immaculatus, Histiophorus, 199
immaculatus, *Lampugus*, 248
immaculatus, *Mesoprion*, 38
immaculatus, Ostracion, 696
immaculatus, Symbranchus, 657
immaculatus, *Systomus*, 560, 571
immaculatus, Tetrodon, 700, 703, 704
immunis, Trygon, 738
imperati, *Remora*, 258
imperator, *Chætodon*, 112
imperator, Holacanthus, 102, 112
implutus, *Crayracion*, 706
implutus, Tetrodon, 706
inagow, 649
incerta, Eleotris, 313
Indian Cyprinidæ, iii
indica, *Ætobatis*, 743
indica, Ambassis, 50, 51
indica, Belone, 510
indica, Channa, 368
indica, Clupea, 639
indica, *Ilisha*, 644
indica, Narcine, 733
indica, Pellona, 642 644
indica, *Sciæna*, 183
indica, *Scyris*, 224
indica, Solea, 426
indicum, Chiloscyllium, 726
indicus, *Batrachus*, 276
indicus, *Blepharis*, 224
indicus, *Cailiomorus*, 276
indicus, *Callionymus*, 276
indicus, Centropogon, 155
indicus, Chanos, 651
indicus, Crenidens, 132
indicus, *Cubiceps*, 237
indicus, *Cyrtus*, 174
indicus, Elops, 649
indicus, Engraulis, 625, 629
indicus, *Heptanchus*, 723
indicus, Histiophorus, 199
indicus, Kurtus, 174
indicus, Megalops, 650
indicus, *Mullus*, 126
indicus, Naucrates, 229
indicus, Ophiocephalus, 367
indicus, *Parupeneus*, 126
indicus, Pimelodus, 448
indicus, *Platygaster*, 644
indicus, Polynemus, 179
indicus, *Pristigaster*, 646
indicus, Psenes, 237
indicus, *Rhodeus*, 555
indicus, *Reversus*, 708
indicus, Saurus, 503
indicus, Scopelus, 507
indicus. *Silurus*, 476, 477
indicus, *Squalus*, 726
indicus, *Stolephorus*, 629
indicus, *Tetrapturus*, 199
indicus, Upeneus, 126
inermis, Cheilio, 407
inermis, Elops. 649
inermis, Ichthyscopus, 261
inermis, *Labrus*, 407
inermis, *Scolopsides*, 85
inermis, Tetrodon, 700, 701
inermis, *Uranoscopus*, 261
infernalis, *Gymnothorax*, 672
infernalis, Muræna, 672
infuscata, *Bogoda*, 55
in-ge-lee, 354
Iniistius, 401
innominatus, Barbus, 558, 570
inornatus, Boleophthalmus, 308
insidiator, *Cottus*, 276
insidiator, Platycephalus, 276
insidiator, *Zeus*, 242
insidiatrix, Equula, 242
insignitus, *Coracinus*, 378
insignitus, Tetrodon, 707
intermedius, Amphiprion, 380
intermedius, Schizothorax, 532
intermedius, Syngnathus, 677, 678
intermedius, Trachyrhamphus, 678
intermedius, Trichiurus, 200
interrupta, Ambassis, 53
interrupta, Equula, 242
interruptum, Cybium, 254, 255, 256
interstinctus, Gobius, 294
inundations, seasons of, xi
ire, Caranx, 220, 225
irregularis Scaphiodon, 551
ire-parah, 220
ire, *Selar*, 220
irrigation works, i
irrwa, 275, 276
irung kellettee, 482
isacurrah tenkee, 738
isinglass, 7, 8, 197
isingleena, Muræna, 670
isingleenoides, *Gymnothorax*, 670
isingleenoides, Muræna, 670
isingteena, *Gymnothorax*, 670
isingteena, Muræna, 670
isingteena, *Thyrsoidea*, 670
isocheilus, *Opsarius*, 589
Isogomphodon, 710
Isoplagiodon, 710
israelitarum, Apistus, 155
issakee-doondoo, 295
isurus, *Gobio*, 549
itchkeea, *Bagrus*, 492
itchkeea, Gagata. 492
itchkeea, *Hemipimelodus*, 493
itchkeea, *Macrones*, 493
itchkeea, *Phractocephalus*, 492
itchkeea, *Pimelodus*, 492

jacksoniensis, *Gymnothorax*, 672
jacobæa, Echeneis, 258
jaculatrix, *Labrus*, 117
jaculator, Toxotes, 117
jaculator, Toxotes, 117
jaculatrix, *Sciæna*, 117
jagur, Clarias, 484
jagur, *Macropteronotus*, 484
jahngarah, Lutianus, 39
jallugu, 649
jangarloo, 645
janseni, Julis, 403, 405
janthinus, *Mesoprion*, 43
japonica, Astrape, 734
japonica, Coryphæna, 248
japonicus, Amphiprion, 379
japonicus, *Anthias*, 87
japonicus, Callionymus, 322
japonicus, Carcharias, 715
japonicus, Dactylopterus, 279
japonicus, Gerres, 99
japonicus, *Lutjanus*, 87
japonicus, Mugil, 253
japonicus, Synaptura, 430
japonicus, Scolopsis, 87, 88
japonicus, *Sparus*, 92
japonicus, Synagris, 91, 92
jarbua, Caranx, 215
jarbua (*Datnia*), Therapon, 69
jarbua, *Sciæna*, 69
jarbua, Therapon, 482
jarras, 140
jarra-dandrée-parrah, 215
jatipyna, 113
jatius, Arius, 458, 466
jatius, Arius, 465
jatius, *Pimelodus*, 466
javanensis, Monopterus, 656
javanica, *Arelia*, 437
javanica, Muræna, 671
javanica, *Plagusia*, 437
javanica, Rhinoptera, 743, 744
javanicum, *Gonostoma*, 632
javanicus, Acanthophthalmus, 611
javanicus, Carcharias, 714
javanicus. *Gymnothorax*, 671
javanicus, Psenes, 237
javanicus, Pseudorhombus, 423, 424
javanicus, *Rhombus*, 424
java, Teuthis, 165
javensis, *Bagrus*, 461
javus, *Amphacanthus*, 165
jaya, Aspidoparia, 585
jaya, *Cyprinus*, 585
jaya, *Leuciscus*, 585
jeerpye, 69
jee-tah-dah, 660
jella, Arius, 458, 465, 467
jellahri, 603
jellum, 470
jello, Sphyræna, 342
Jerdon, Dr., iii, v, 352
Jerdonia, 605, 609, 611
jerdoni, Barbus, 558, 568
jerdoni, *Brachygramma*, 555
jerdoni, Discognathus, 527, 528
jerdoni, Erethistes, 452
jerdoni, Labeo, 542

jerdoni, Mugil, 347, 352
jerdoni, Pomacentrus, 382, 383
jer-i-kee, 480
jerree potoo, 428, 430, 431, 433
jerreus, Brachirus, 430
jerreus, Solea, 430
jerreus, Synaptura, 430
jerruah, 559
jillung, 488
jilo, 584
jiluga tirikee, 740
jinnagow, 649
jis, 529
jogia, Cyprinus, 583
johannæ, Anguilla, 660
johnii, *Anthias*, 42, 43
johnii, Lutianus, 42
johnii, *Lutjanus*, 42
johnii, *Mesoprion*, 43
Johnius, 184
johra, 590
Jones, Mr. Winter, vii
jonir, 584
jongja, 583
joon-gah, 565
jorah, Chela, 599
jourdin, Lutjanus, 379
jubbi cowri, 609, 610
jugar, 340
juggari, 98
Julis, 390, 403
Julis, 396, 397, 407
julis, Coris, 407
jundoori, 560
jungla, 492
juppah, 499

kaakan, Pristipoma, 74
kachhi, 598
kadil cudray, 677
kadoon, Barbus, 560
kadoon, Cyprinus, 560
kaha-laweyah, 15
kahi-sandawa, Chætodon, 236
kahlee-poee, 128
kah-nee potiah, 577
kahree meen, 487
kajoli, 489
kakachia kerundi, 580
kakaitsel, Glyphisodon, 415
kakasi, 174
kakoo, Cyprinus, 560
kakunda, 354
ka-ku-yan, 179
kakus, Barbus, 560
kala, 176
kala-batta, 548
kala-battoli, 543
kala-beinse, 536
kalak, 374
kala-mudwan, 140
kala-poo-ti-ah, 128
kala-tala, 554
kalbasu, 536
kali-korafi, 555
kalla, Caranx, 219
kalla-parah, 220
kalla, *Selar*, 219
kallee-moee, Sparus, 37
kallolepis, Ammodytes, 420
kallolepis, *Bleekeria*, 420
kalloodi, 105
kalolo, Periophthalmus, 303
kalosoma, *Apoia*, 57
kalosoma, Apogon, 57
kalosoma, *Lepidamia*, 57
kamacha singi, 487
kammalensis, Engraulis, 624, 626
kammalensis, *Stolephorus*, 626
kanagurta, 250
kanagurta, *Alosa*, 640
kanagurta, Clupea, 635, 640, 641
kanagurta, Scomber, 250
kan-doo-lee, 653
kanipabda, 477
kanki-sandawa, Zeus, 235
kannaku, 560
kanya tenggara, 499
kaoli, 577
kapirat, *Mystus*, 653
kapirat, Notopterus, 653
kappa, 699, 702, 703, 704
kappa, Arothron, 703
kappa, Chelonodon, 703
kappa koorawah, 701
kappa-muru-moia, 271
kappa, Tetrodon, 703
karaal, 447
karah, Zeus, 243
karamoottee sorrah, 716
karamunji-parah, 220
kara-pamoowah, 204
kar-arwoolee, 247
karavu, 367
ka-reer-re, 585
karna-kita, 250
karnang-kullutan, 250
karooi, Perca, 35
karoom-kattelee, 188
karoom palasi, 708
karrouvei, Ophiocephalus, 367
karssar, 415
karwa, 135
karwa, Lethrinus, 135
karwa, *Sparus*, 135
kasmira, Diacope, 33
kasmira, Sciæna, 33
ka-sondara, 129
ka-sundara, 128
katha boung, 490
katcha karawa, 571, 579
katchelee, Labrus, 189
katch karawa, 579
kate, Scolopsis, 87
katho, 179
katkaya, Holocentrus, 70
katladi, 568
katunko, Pomacentrus, 383
kaupii, *Arelia*, 434
kaupii, Cynoglossus, 434
kavasi tengara, 447
kawarin, *Halichœres*, 401
kawarin, *Julis*, 400
kawarin, Platyglossus, 398, 400
kawaya, 370
kawhy-ya, 370
kawrus, *Chondrostoma*, 545
kawrus, Labeo, 535, 545
keelee, 640
keelputa, Perca, 68
keen-see, 133
Keess, Dr., vi
keetchan, 69
kelaartii, Mugil, 347, 352
kelaartii, Ophiocephalus, 367
keletius, Bagrus, 451
keletius, *Bagrus*, 449
keletius, Macrones, 443, 449
keletius, Macrones, 451
kel-le-tee, 448
Kemaon trout, 530
kem-pu-per-ru-wul, 567
ke-raad, 472
keris, 202, 208
kerrundi, 571
Ketengus, 440, 468
kettalam sorrah, 718
khan-ge, 595
kharsa, 541
khira, 587
khoksa, 590
khorika, 616
khudree, Barbus, 569
khyeng-khayowk, 105
kich-uk-louar, 638
kiliche, Caranx, 214
kinda-meen, 543
ki-ri-dee, 491
kirkii, Salarias, 329, 331
kiru wahlah, 652
kleinii, Balistes, 693
kleinii, Chætodon, 106
kleinii, Scomber, 216
klunzei, Clupea, 635, 636
klunzei, *Harengula*, 636
Klunzinger, Dr., v
kocha, 474
kodipungi, Pseudomonopterus, 152
kodipungi, Pterois, 152
kodryn, 117
koduwa, 7
koelreuteri, *Euchoristopus*, 303
koelreuteri, *Gobius*, 303
koelreuteri, Naucrates, 229
koelreuteri, Periophthalmus, 303, 307
koelreuteri, Scomber, 229
koh-lee-hona, 374
kohli-meen, 202
koilomatodon, Eleotris, 315
koi omatodon, Prionobutis, 315
kokanutchee, 584
kokius, Gobius, 295
koku, Gobius, 294
kolacanthus, 699
kolees, 542
koli, 205
kol-lid-dah, 115
ko-lig-dah, 247
kolus, Barbus, 558, 567, 573
kolus, *Capoeta*, 573
kolus, *Hypselobarbus*, 573
komah-karah, Zeus, 244
koman sorrah, 719
komara-parah, 213
kome, 634
komrasi, 725
komuki, Monacanthus, 693
konam, Cybium, 255
konam, Scomber, 255
kondaturi, 609
kontius, *Cyprinus*, 539
kontius, Labeo, 535, 539
koochina murl, 366
koo-door-rock-o-dah, 516
kooli, 582
kooroota, 138
kootili, 234
ko-pud-dah, 705
koppara girawah, 406
kora, Gobius, 295
kora motta, Ophiocephalus, 367
korah-mottah, Gobius, 294, 295
koraké, 260
korandilli-parah, 215
koral, 7
korang, 594
korova, 368
ko-re-dah, 345
korely, Lethrinus, 135
korely, 135
kore-paig-dah, 633
koroon, 571
koswati, 581
kot aralu, 433
kotah, 662
ko-tah-thoo-lay-po-dah, 685
koti, 587
kotree, 577
kotuwa tirike 745
kove-keetchan, 69
Kowala, 634
kowal, Alosa, 635
kowal, Clupea, 635, 637, 748
krefftii, Gobius, 288
Kryptopterichthys, 475
Kryptopterus, 475
kubrah, 363
kuda, Hippocampus, 682
kuddera, 512, 513
kud-di-an, 522
kuddul mah-cutchee, 699
kudji kerundi, 578
kuggur, 448
kug-ga, 485, 499
kuhlii, *Cephaloptera*, 745
kuhlii, Cirrhina, 546
kuhlii, Corvina, 191
kuhlii, Cybium, 254
kuhlii, Dangila, 546
kuhlii, Dicerobatis, 744, 745
kuhlii, Panchax, 523
kuhlii, Selar, 218
kuhlii, Sciæna, 183
kuhlii, Syngnathus, 678
kuhlii, Trygon, 737, 738
kuhlii, Umbrina, 183
kuh-nah-nee, 560
kukhiah, 565
kul-aral, 340
kulivi pamboo, 662
kul-ka-batta, 540
kullahray, 315
kullawaee, 19
kullaroy-meen, 399
kulli-karé, 240
kullu-korake, 73
kul moonjilli, 392
kul-nakura, 617
kul-ooloova, 263
kul-oolavoo, 292
kunamoo, 560
kunehon pungti, 576
kundala, 128
kundna, 536
kundul, 87, 600
kung-gi, 52, 375
kunhartii, Serranus, 16
kunhardti, Tetrodon, 704
kun-gee, 374
kunkakie, 129
kunnadee, 105
kunnamoo, Cyprinus, 560
kunnesee, Mugil, 349
kunni-parah, 221
kunnoo tirike, 739
kun-nul, 590
kunnur dant, 679
kunsul, Pastinaca, 741
kunto, Cyprinus, 560
kuntiah, 448
kurchi, 537
kurdan, 295
kuri meen, 567
kurite, Scolopsides, 87
kurite, Scolopsis, 87, 88
kurite, Sparus, 87
kurpah, Gobius, 295
kurra, Caranx, 214
kurra, *Decapterus*, 214
kurra-wodagawah, 214
kurreah, 565
kurriah dahwiee, 583
kurri-menu, 536

kurri-minu, 536
kurroogoo-parah, 214
kurrun-toumbi, 153
kurrupu, 18
KURTIDÆ, 174
kurtus, 174
kurzii, *Akysis*, 490
kussuah, 374
kutcha-karawa, 572
kut-e-rah, 166
kuttahrah, 447
kutta-keetchan, 70
kuturnee, *Bagrus*, 456
kuturnee, *Phractocephalus*, 456
kuturnee, Rita, 456
kwey-yeng, 179
kyouk-nya-loo, 543
Kyphosus, 142
kyouk-theyga-kakadit, 19
kyoung-na-sah, 53

laal-chandee, 51
Labeo, 534, 604
Labeobarbus, 556
labiatum, Exostoma, 501
labiatus, *Glyptosternum*, 501
labiatus, Pomacentrus, 382, 384
labiatus, Schizothorax, 532
labiosus, Mugil, 348, 355, 357
labiosus, Trichogaster, 373, 374
LABRIDÆ, 390
Labristoma, 267
Labroidei ctenoidei, 377
Labroidei cycloidei, 390
Labroides, 390, 392
Labroperca, 8, 9
labrosa, Anguilla, 659, 660
Labrus, 407
Labyrinthibranchii, 369
LABYRINTHICI, 362, 369, 439
Lacépède, ii
lacépède, Gomphose, 406
lacerta, *Scarus*, 412
Lactarius, 244
lactarius, *Scomber*, 245
ladacensis, Nemacheilus, 613, 618
Lœtophrys, 695
lœve, Holocentrum, 173
lœviceps, Arius, 460
lœvigatus, *Chironectes*, 272
lœvis, *Aleuteres*, 694
lœvis, *Alutarius*, 694
lœvis, *Balistes*, 694
lœvis, Monopterus, 656
lœvis, *Rhinobatus*, 731
lœvis, Rhynchobatus, 731
lœvis, *Unibranchapertura*, 656
Lagocephalus, 699
lagocephalus, Tetrodon, 705
lah-bo-e, 550
lahoord, 487
lak-atha-dah, 678
lala, Ambassis, 51
lala, *Chanda*, 51
lalius, *Colisa*, 375
lalius, Trichogaster, 373, 375
lal kholisha, 375
lama-guliminda, *Sparus*, 91
lamarrii, *Bagrus*, 444
lamarrii, Macrones, 444
lama yellakah, 687
lambi kaoli, 573
lamghur, *Silurichthys*, 479
lamghur, *Silurus*, 479
Lamiopsis, 710
LAMNIDÆ, 709, 722
Lamnostoma, 664
lamourouxii, Balistes, 691
Lampanyctus, 506
Lampugus, 248
lamta, *Cyprinus*, 527
lamta, Discognathus, xiv, 524, 527, 528
lamta, *Garra*, 528
lamta, *Lobocheilos*, 528
lanceolata, *Eleotris*, 301
lanceolata, Murænesox, 661
lanceolatus, Apocryptes, 301
lanceolatus, *Epinephelus*, 18
lanceolatus, *Pseudapocryptes*, 301
lanceolatus, Serranus, 18, 101
lasseen, 541, 549
lata, Ophiocephalus, 367
lateoides, Otolithus, 197
lateralis, Callionymus, 323
lateralis, *Leuciscus*, 584
lateralis, *Misgurnus*, 609
lateristriga, Upeneus, 123
laterna, *Arothron*, 706
laterna, *Crayracion*, 706
laterna, Tetrodon, 706
Lates, 7
latha, 129
latia, Cirrhina, 547, 548
laticaudus, Carcharias, 711, 712
laticeps, *Ætobatis*, 743
laticeps, *Branchiosteus*, 475
laticeps, Holocentrum, 172
laticeps, Olyra, 475
laticeps, Ptychobarbus, 533
laticeps, *Silurus*, 486
laticeps, Zygæna, 719
laticlavius, Amphiprion, 379
latifasciatus, Serranus, 9
latipes, *Pœcilia*, 522
latipinnatus, *Opsarius*, 592
latirostris, Ætobatis, 743
latirostris, Pegasus, 280
latius, *Crossocheilus*, 548
latius, *Cyprinus*, 548
latovittatus, *Cryptopterus*, 479
latovittatus, *Fissilabrus*, 393
latovittatus, Labroides, 393
latovittatus, *Labrus*, 393
latovittatus, *Tœnianotus*, 157
Latrunculini, 281
latte, *Chœtodon*, 116
latus, *Scarus*, 411
latus, *Scomber*, 227
Laubuca, 598
laubuca, *Chela*, 598
laubuca, *Cyprinus*, 598
laubuca, Perilampus, 598
Laurida, 503, 504
lauta, *Kowala*, 637
layardi, Arius, 456, 466, 467
layardi, Barbus, 573
layardi, Chætodon, 747
layubuka, 598
le-beck, *Uranoscopus*, 261
Lebias, 521
lee-gur, 636
lee-mee-jo-do-dah, 309
leeuwenii, *Cestracion*, 720
Leiocassis, 440, 451
leiogaster, Clupea, 635, 636
leiogaster, *Sardinella*, 636
Leioglossus, 210, 211
Leiognathus, 237
leiopleura, Tetrodon, 701
Leiopsis, 93
Leiostomus, 184
Leisomus, 699
Leiurus, 686
leiurus, Belone, 509, 511
leiurus, *Mastacembelus*, 511
Lembus, 308
lemniscatus, Lutianus, 36
lemniscatus, *Osmerus*, 504
lemniscatus, Saurus, 504
lemniscatus, *Serranus*, 36
lemuru, Clupea, 636
lemuru, *Sardinella*, 636
lena-girawah, 405
lentiginosus, Ostracion, 696
Lentipes, 298
leonoides, Holocentrum, 172
leopardinus, *Rhomboidichthys*, 425
leopardus, Blennius, 325
leopardus, *Epinephelus*, 25
leopardus, *Labrus*, 25
leopardus, *Scomber*, 254
leopardus, Serranus, 25, 26
leopardus, Tetrodon, 700, 706
leparensis, *Julis*, 399
leparensis, *Halichœres*, 399
leparensis, Platyglossus, 397, 399
Lepidamia, 56
Lepidocephalichthys, 605, 609, 621
Lepidocybium, 254
Lepidogobius, 282
Lepidoplois, 391
Lepidozygus, 381
lepidurus, Heliastes, 388, 389
lepidus, *Puntius*, 575
leprosus, *Pneumobranchus*, 656
Leptecheneis, 257
Leptobotia, 524
Leptocephali, 658
Leptochromis, 267
Leptognathus, 663
leptolepis, *Selaroides*, 225
leptolepis, Caranx, 225
leptolepis, *Letaspis*, 225
Leptonurus, 630
Leptorhinophis, 664
Leptorhynchus, 663
leptosomus, *Systomus*, 578
lepturus, *Conger*, 661
lepisurus, *Sparus*, 44
lepturus, Trichiurus, 201
lepturus, Uroconger, 661
leschenaultii, Cirrhina, 547
leschenaultii, *Cirrhinus*, 536
leschenaultii, *Dangila*, 547
leschenaultii, *Julis*, 400
leschenaultii, Labeo, 536
leschenaultii, Pellona, 643, 646
leschenaultii, Pellona, 645
leschenaultii, Platax, 236
leschenaultii, *Rohita*, 536
lessonii, Caranx, 216
lessonii, Diagramma, 78, 79, 80
lessonii, *Plectorhynchus*, 78
lessonii, *Tetrapturus*, 199
lessonii, Xiphasia, 337
Lethrinus, 134
letiginosus, *Rhombus*, 423
leucerus, *Opsarius*, 603
Leuciscus, 583, 599
leuciscus, Dules, 67
leucogaster, Glyphidodon, 385, 388
leucomos, Hemigymnus, 396
leucomos, *Tautoga*, 396
leucophasis, *Bagrus*, 449
leucophasis, Macrones, 443, 449
leucopleura, Glyphidodon, 385
leucopleura, Pomacentrus, 384
leucopterus, Hemiramphus, 513, 514
leucopunctatus, Ophiocephalus, 363, 364
leucosternon, Acanthurus, 203
leucostigma, Serranus, 21
leucostictus, *Labrus*, 392
leucotænia, Scolopsis, 88, 89
leucotænia, *Scolopsides*, 88
leucotœnioides, *Scolopsides*, 88, 89
leucurus, *Naucleus*, 229
levenensis, Salmo, 508
lewini, Zygæna, 719
liacanthus, Barbus, 571
Lichoidei, 229, 250
lida, *Arelia*, 436
lida, Cynoglossus, 432, 436
lida, *Plagusia*, 436
lienardi, Petroscirtes, 326, 327
ligonifer, Rhinobatus, 732
lile, Clupea, 635, 638, 639
lile, *Meletta*, 634, 638
Limamurœna, 667
limbatum, *Catochœnum*, 100
limbatus, Carcharias, 711, 716
limbatus, *Diapterus*, 100
limbatus, Gerres, 100
limbatus, Hemiramphus, 513, 516
limbatus, Ophiocephalus, 367
limbatus, Plotosus, 483
limbatus, Saurus, 504
limnophilus, *Gobio*, 549
linearis, Moringua, 666
linearis, *Ptyobranchus*, 666
lineata, *Perca*, 66, 78
lineata, *Rohita*, 545
lineata, *Sciœna*, 78
lineato-oculatus, Eleotris, 311
lineatum, Diagramma, 78, 79, 80, 747
lineatum, Englyptosternum, 500
lineatum *Panchax*, 522
lineatus, Acanthurus, 203
lineatus, *Anthias*, 74
lineatus, *Arothron*, 705
lineatus, Balistes, 691
lineatus, *Chœtodon*, 103
lineatus, Cheilodipterus, 66
lineatus, *Crayracion*, 705
lineatus, *Ctenodon*, 203
lineatus, Danio, 597
lineatus, *Grammistes*, 78
lineatus, Haplochilus, 522
lineatus, Holacanthus, 112
lineatus, *Plectorhynchus*, 78
lineatus, Plotosus, 483
lineatus, Polynemus, 179
lineatus, *Rhinecanthus*, 691
lineatus, *Rhombotides*, 203
lineatus, Salarias, 329, 332
lineatus, *Scolopsides*, 85
lineatus, Scolopsis, 86
lineatus, Serranus, 13
lineatus, Tetrodon, 700
lineatus, Tetrodon, 705
lineolata, *Diacope*, 35
lineolata, Equula, 241
lineolata, *Mesoprion*, 35
lineolata, *Sardinella*, 638
lineolatum, Cybium, 256
lineolatum, Cybium, 255
lineolatus, Callionymus, 321, 323
lineolatus, Danio, 596
lineolatus, *Leuciscus*, 596
lineolatus, Lutianus, 32, 35
lineolatus, *Mesoprion*, 34
lineolatus, Seriolichthys, 228
lineopinnis, Muræna, 671
lineopinnis, *Thyrsoidea*, 672
lingua, *Arelia*, 433
lingua, Cynoglossus, 432, 433
lingua, Cynoglossus, 433
lingua, *Plagusia*, 433
linguatula, *Balistes*, 693

Liocassis, 492
lioglossus, Lutianus, 39, 40
lioglossus, *Lutjanus*, 39
Liomonacanthus, 692
Lioperca, 8
Liosaccus, 699
Lissorhynchus, 527
lissorhynchus, *Platycara*, 528
lissorhynchus, *Gobio*, 542
lita, Muræna, 672
literata, Muræna, 668
literata, *Strophidon*, 668
lithopidos, Barbus, 556, 557, 567
litoralis, Eleotris, 314
littoralis, Pomacentrus, 382, 383
litturatus, Gobius, 292
loannee, 541
lobato, *Corvina*, 191
Lobocheilus, 534
Lobotes, 83
lobura, 565
lo-har, 487
lo-har-ree, 589
loh-one, 532
loi, 542
lolla-terate, 113
lonah, *Bogrus*, 496
lonah, Glyptosternum, 496, 499
longicauda, *Dilobomycterus*, 704
longicauda, *Petronason*, 411
longicauda, *Pteroleptus*, 152
longicaudata, *Lycodontis*, 668
longicaudata, Olyra, 475
longicaudata, *Strophidon*, 668
longicaudatus, Callionymus, 321, 322
longicaudus, *Squalus*, 725
longiceps, Clupea, xv, 623, 635, 637, 710
longiceps, Ptycobarbus, 533
longiceps, *Sardinella*, 634, 636
longiceps, Scarus, 411
longicornis, Nascus, 209
longifilis, Pagrus, 138
longimana, Drepane, 116
longimanus, *Chætodon*, 116
longimanus, *Ephippus*, 116
longimanus, *Equula*, 101
longimanus, *Harpochirus*, 116
longimanus, Mugil, 349
longimanus, Pentaprion, 101
longimanus, Pseudeutropius, 471
longipinna, *Variola*, 27
longipinnis, *Acanthocobitis*, 614
longipinnis, Schizothorax, 532
longirostris *Acarauna*, 406
longirostris, *Chætodon*, 109
longirostris, Chelmo, 109
longirostris, *Chelmon*, 109
longirostris, *Conger*, 662
longirostris, Hemiramphus, 514
longirostris, Hemiramphus, 513
longirostris, Hippocampus, 682
longirostris, *Labrus*, 99
longirostris, Lethrinus, 135
longirostris, Syngnathus, 677
longirostris, *Trachyrhamphus*, 677
longirostris, Triacanthus, 685
longispinis, Amblyapistus, 157
longispinis, *Apistus*, 157
longispinis, Barbus, 565
longispinis, Chrysophrys, 140
longispinis, Equula, 243
longispinis, Serranus, 14, 15
longispinis, *Tetraroge*, 157
longissima, *Thyrsoidea*, 672
longissimus, Balistes, 688
longus, Balistes, 688

look-wa-dah, 250
loolla, 366
loo, Scomber, 251, 747
Lophioidei, 271
lophioides, Chaca, 481
lophioides, Echeneis, 258
Lophiogobius, 282
LOPHOBRANCHII, 676
Lophobranchii, breeding of, 676
Lophogobius, 282
lophotes, *Chironectes*, 271
lopis Notopterus, 654
louar, 636
louti, *Bodianus*, 26
louti, *Perca*, 26
louti, *Pseudoserranus*, 27
louti, *Serranus*, 27
louti, Variola, 26, 27
lucidus, Gerres, 98, 99
Luciobarbus, 556
Luciocephalidæ, 369
lukwah, 179
lumbriciformis, Moringua, 666
lumbricoidea, Moringua, 666
luna, *Cryptosmilia*, 116
lunaris, Chætodon, 106
lunaris, *Chloriichthys*, 404
lunaris, *Gastrophysus*, 701
lunaris, Julis, 403
lunaris, *Labrus*, 403
lunaris, *Physogaster*, 701
lunaris, *Promecocephalus*, 701
lunaris, Tetrodon, 699, 700, 701
lunata, Echeneis, 257
lunatus, Cyprinodon, 521
lunula, Chætodon, 108
lunula, *Pomacentrus*, 108
lunulata, *Perca*, 41
lunulatus, Lutianus, 41
lunulatus, *Lutjanus*, 41
lunulatus, *Mesoprion*, 41
lurida, Silondia, 488
luridus, *Pachypterus*, 495
lutea, *Coryphæna*, 90, 91
luteus, *Dentex*, 91
luteus, Eleotris, 314
luteus, *Mullus*, 125
luteus, *Parupeneus*, 125
luteus, Synagris, 90, 91
luteus, Upeneus, 125
Lutiani, colour in, 29
Lutianus, 29
lutianus, Lutianus, 47
lutjanus, *Mesoprion*, 47
Lutodeira, 651
Lycengraulis, 624
Lycodontis, 667
lycogenis, *Dentex*, 93
lycogenis, *Scolopsides*, 89
Lycothrissa, 624
lysan, Chorinemus, 231
lysan, *Lichia*, 231
lysan, *Scomber*, 231

maal-le, 595
macclellandi, *Aplocheilus*, 422
macclellandi, Bregmaceros, 418
macclellandii, *Devario*, 595
macclellandi, *Gonorhynchus*, 528
machnata, Elops, 649
machnata, *Argentina*, 649
macloti, Carcharias, 711, 713
Macolor, 29
macracanthus, *Alutarius*, 693
macracanthus, Ambassis, 52, 53
macracanthus, Amblyapistus, 158
macracanthus, *Apistus*, 158
macracanthus, Arius, 465
macracanthus, Crenidens, 133
macracanthus, *Mesopristis*, 71
macracanthus, Platycephalus, 276
macracanthus, *Tetraroge*, 158
macrocephala, Albula, 649
macrocephala, *Clupea*, 649
macrocephala, Moringua, 666
macrocephalus, *Aphthalmichthys*, 666
macrocephalus, Barbus, 565
macrocephalus, *Bodianus*, 15
macrocephalus, Gymnomuræna, 674
macrocephalus, *Rhodeus*, 555
macrochilus, Mugil, 355
macrochir, Discognathus, 528
macrochir, Moringua, 666
Macrochirichthys, 599
Macrochyrus, 152
macrodon, *Centropomus*, 66
macrodon, Chærops, 391
macrodon, *Cossyphus*, 391
macrodon, Eleotris, 311
macrodon, *Odonteleotris*, 311
Macrodonophis, 664
macrodontus, *Labrus*, 391
macrogaster, *Labrus*, 387
macrognathus, *Thryssa*, 627
macrolepidota, *Arelia*, 434
macrolepidota, *Capoeta*, 570
macrolepidota, *Capoeta*, 571
macrolepidota, *Dormitator*, 310
macrolepidota, Eleotris, 310, 748
macrolepidota, *Hampala*, 571
macrolepidota, *Plagusia*, 434
macrolepidota, *Sciæna*, 310
macrolepidotus, Barbus, 558, 571
macrolepidotus, *Chætodon*, 110
macrolepidotus, Curtus, 175
macrolepidotus, Cynoglossus, 432, 434
macrolepidotus, *Diphreutes*, 110
macrolepidotus, Heniochus, 110
macrolepidotus, Mugil, 353, 359
macrolepis, Barbus, 565
macrolepis, *Labeobarbus*, 564
macrolepis, Myripristis, 169
macronema, *Mullus*, 123
macronema, *Parupeneus*, 123
macronemus, *Mullus*, 123
macronemus, Upeneus, 123, 124
macronemus, Synagris, 91
Macrones, 440, 442, 492
Macrones, 451
Macrones, size of ova, 445
macronotacanthus, Arius, 458, 461, 465
macronotacanthus, *Cephalocassis*, 465
macronotus, *Cirrhinus*, 535
macronotus, Labeo, 535
Macropharyngodon, 397
macrophthalmus, Amphisile, 361
macrophthalmus, *Anthias*, 48
macrophthalmus, Balistes, 687
macrophthalmus, Callichrous, 476, 478
macrophthalmus, Caranx, 218
macrophthalmus, *Corvina*, 189
macrophthalmus, *Leiurus*, 687
macrophthalmus, Megalops, 650
macrophthalmus, *Otolithus*, 189
macrophthalmus, *Pseudosciæna*, 190
macrophthalmus, *Pseudosilurus*, 478
macrophthalmus, Sciæna, 189

macropodus, Perilampus, 598
macrops, Balistes, 688
macroptera, *Goniobatis*, 743
macroptera, Umbrina, 182
macropteroides, *Amia*, 64
macropteroides, Apogon, 64
Macropteronotus, 483
macropterus, *Amia*, 64
macropterus, Apogon, 64
macropterus, Megalops, 650
macropterus, *Sciæna*, 182
macropterus, Thynnus, 253
macropterus, Triodon, 698
macrorhynchus, Carcharias, 712
macrorhynchus, Cynoglossus, 433
macrostomus, Callichrus, 480
macrostomus, *Gobius*, 286
macrostomus, *Gobiopsis*, 286
macrostomus. *Gonorhynchus*, 548
macrourus, *Perilampus*, 583
macrura, Clupea, 641
macrura, Muræna, 667, 672
macrura, Narcine, 733
macrurus, Gobius, 291
macrurus, Muræna, 672
macrurus, *Thyrsoidea*, 672
macrurus, Trygon, 737
macularius, *Systomus*, 576
maculata, *Balitora*, 526
maculata, Brotula, 419
maculata, *Corvina*, 190
maculata, Homaloptera, 526
maculata, Jerdonia, 611
maculata, Mene, 249
maculata, *Muræna*, 659, 660
maculata, Myliobatis, 742
maculata, Narcine, 733
maculata, Percis, 263
maculata, *Platycara*, 526
maculata, Sciæna, 190
maculata, Sciæna, 189
maculata, Sillago, 265
maculata, Solea, 426
maculata, *Strophidon*, 668
maculatum, Pelor, 161
maculatum, Pristipoma, 74
maculatum, Scyllium, 724
maculatus, Achirus, 427
maculatus, *Anthias*, 74
maculatus, Balistes, 686, 687
maculatus, *Chætodon*, 415
maculatus, *Cirrhites*, 146
maculatus, Cirrhitichthys, 146
maculatus, Diptychus, 534
maculatus, *Epinephelus*, 14
maculatus, Etroplus, 414, 415, 416
maculatus, Galeocerdo, 718
maculatus, *Galeus*, 718
maculatus, Gobius, 294
maculatus, *Heptanchus*, 723
maculatus, *Holocentrus*, 14
maculatus, *Johnius*, 189
maculatus, *Johnius*, 190
maculatus, Lethrinus, 135
maculatus, *Lutjanus*, 74
maculatus, Notopterus, 654
maculatus, *Notorhynchus*, 723
maculatus, *Opsarius*, 593
maculatus, Oreinus, 529, 530
maculatus, Otolithus, 196
maculatus, *Platacanthus*, 611
maculatus, *Pleuronectes*, 427
maculatus, *Pterurus*, 666
maculatus, *Sargus*, 114
maculatus, Serranus, 14
maculatus, Tetrodon, 703, 705
maculatus, *Zeus*, 249
maculipinnis, Carcharias, 716

maculosus, Apogon, 64
maculosus, Chætodon, 112
maculosus, Cirrhites, 146
maculosus, Holacanthus, 112
maculosus, Pseudoscarus, 412
maculosus, Rhombus, 424
maculosus, Scarus, 412
maculosus, Serranus, 19
maculosus, Scomber, 255
madagascariensis, Cottus, 276
madagascariensis, Scomber, 231
madagascariensis, Xiphogadus, 337
madinawa-bontoo, Perca, 19
Madras, Ichthyological Gleanings in, v
madras, Lutianus, 47
madras, *Mesoprion*, 47
madraspatanum, Glyptosternum, 496, 498
madraspatensis, Butirinus, 651
madraspatensis, Esomus, 583
madraspatensis, Gobius, 290
madurensis, Apocryptes, 300
Mænides, 5
Mænoidei, 127
mærens, Gonopterus, 111
maga-booshee, Polynemus, 179
maga-jellee, Polynemus, 180
magi, 355
magniloquus, Gobius, 296
magurah, 485
magur, Clarius, 484, 485, 486
magur, *Macropteronotus*, 485
mahecola, Barbus, 556, 558, 575
mahecola, *Leuciscus*, 575
mahe, Scorpæna, 154
mah-gur, 485
mah korava, 367
mahlee, 536
mahseer, 564
mahturi, 292
mah-wa, 583
mah-wu-laachi, 255
mais-parah, Scomber, 221
major, Gallichthys, 224
Malabar, Fishes of, i
malabarica, Anguilla, 660
malabarica, *Catopra*, 131
malabarica, *Citula*, 222
malarabica, *Clupea*, 625
malabarica, Elacate, 256
malabarica, *Garra*, 528
malabarica, *Hara*, 450
malabarica, Pempheris, 175
malabarica, Sciæna, 265
malabarica, Sillago, 265
malabaricus, Ambassis, 54
malabaricus, Arius, 458, 464
malabaricus, Barbus, 558, 569
malabaricus, Barbus, 566
malabaricus, *Bagrus*, 450
malabaricus, *Carangoides*, 222
malabaricus, Caranx, 211, 221, 222
malabaricus, Carcharias, 716
malabaricus, Callichrous, 476, 478
malabaricus, Danio, 595, 596
malabaricus, Engraulis, 624, 625
malabaricus, Esomus, 583
malabaricus, Gobius, 293
malabaricus, *Holocentrus*, 19
malabaricus, Leuciscus, 584
malabaricus, Lutianus, 31
malabaricus, *Lutjanus*, 31
malabaricus, Lutjanus, 33
malabaricus, Macrones, 443, 450, 451
malabaricus, Mastacembelus, 341
malabaricus, *Mesoprion*, 31
malabaricus, Mesoprion, 33
malabaricus, Mullus, 126
malabaricus, *Nandus*, 131
malabaricus, Olistus, 223
malabaricus, Opsarius, 592
malabaricus, Osteocheilus, 552
malabaricus, *Perilampus*, 595
malabaricus, Platycephalus, 277, 278
malabaricus, Pristolepis, 130, 131
malabaricus, Rasbora, 584
malabaricus, *Scomber*, 221
malabaricus, Serranus, 19
malabaricus, *Silurus*, 478
malabaricus, Sparus, 31, 42
malabaricus, Spratelloides, 648
malabaricus, *Thryssa*, 625
malabaricus, Trichiurus, 201
malabaricus, Upeneus, 126
malabaricus, *Wallago*, 478
Malacocentrus, 401
malacopterus, Systomus, 581
malacostomus, Labeo, 540
malacostomus, Gobio, 540
malam, Caranx, 226
malam, *Selar*, 226
malayana, Alausa, 640
Malayan Fish, Catalogue of, iii
malayanum. Hemiscyllium, 726
mal-girawah, 403
malgumora, Anguilla, 660
malgumora, Muræna, 660
malleus, Zygæna, 719
Maltheoidei, 271
malo, Dules, 67
mang-moo-goo-de-lah-dah, 292
mangoe fish, 176
mangois, Amblyceps, 490
mangois, *Pimelodus*, 490
mangri, 485
mangula-kutti, Sparus, 175
mangula, Pempheris, 175
manillensis, Crayracion, 704
manillensis, Tetrodon, 704
manjong, Arius, 460
manminna, Chatoessus, 632, 633
manminna, *Clupanodon*, 633
mannulus, Hippocampus, 682
manti-bukaro-paumu, 665
manu ulava, 730
marciac, Pimelepterus, 143
margaritacea, Eleotris, 312
margaritatus, *Anosmius*, 708
margaritatus, *Canthogaster*, 708
margaritatus, *Psilonotus*, 708
margaritatus, *Rhynchotus*, 708
margaritatus, Tetrodon, 701, 707
margaritatus, *Tropidichthys*, 708
margaritifera, Teuthis, 167
margaritifera, Teuthis, 167
margaritiferus, *Amphacanthus*, 167, 168
margarodes, Leuciscus, 585
marginalis. Epinephelus, 15
marginalis, Serranus, 15
marginata, *Diacope*, 44
marginata, *Genyoroge*, 45
marginatum, Holocentrum, 172
marginata, *Julis*, 398
marginatum, Tetradrachmum, 381
marginatus, Chætodon, 108
marginatus, *Dascyllus*, 381
marginatus, Dules, 67
marginatus, Esox, 516
marginatus, *Halichœres*, 398
marginatus, Hemiramphus, 515, 516
marginatus, Holocentrus, 15
marginatus, Lutianus, 29, 44
marginatus, *Lutjanus*, 45
marginatus, Melichthys, 690
marginatus, *Mesoprion*, 45
marginatus, Ophiocephalus, 367
marginatus, *Paradules*, 67
marginatus, Platyglossus, 397
marginatus, Plotosus, 483
marginatus, Pristolepis, 130
marginatus, Trygon, 737, 738
marin, Chameau, 695
marmorata, Achirus, 427
marmorata, Anguilla, 658
marmorata, Anguilla, 659
marmorata, *Cobitis*, 620
marmorata, Gymnomuræna, 674
marmorata, Muræna, 660
marmorata, *Paraplagusia*, 431
marmorata, Plagusia, 431
marmorata, Teuthis, 166
marmoratum, Scyllium, 724
marmoratus, *Amphacanthus*, 166
marmoratus, Antennarius, 272
marmoratus, *Blennius*, 335
marmoratus, *Chironectes*, 272
marmoratus, Cirrhitichthys, 146
marmoratus, *Labrus*, 146
marmoratus, Leisomus, 703
marmoratus, Mastacembelus, 340
marmoratus, Monopterus, 656
marmoratus, Nandus, 129, 130
marmoratus, Nemacheilus, 613, 620
marmoratus, Petroscirtes, 328
marmoratus, Salarias, 330, 335
marmoratus, Uranoscopus, 260
mar-pakke, 573
marpoo, 485
mar-pu, 487
marpus, Clarias, 485
marrawa, 647
martoo-plachee, 697
marulius, Ophiocephalus, 363
masoni, Gobius, 287
massachusettensis, Monacanthus, 693
Mastacembelidæ, 338
Mastacembelus, 339, 748
Mastacembelus, 338, 509
mastax, Pseudoscarus, 411
mastax, Scarus, 411
mata, Acanthurus, 205, 206
mate, Caranx, 219
mato, Dules, 67
matoides, Acanthurus, 205, 206
matoides, *Rhombotides*, 205
mauritiana, Clupea, 632
mauritiana, Anguilla, 659, 660
mauritianus, Caranx, 218
mauritianus, Chorinemus, 231
mauritianus, Eleotris, 313
maya, Cobitis, 609
mayenna, Amblyopus, 319
Mayoa, 527
McClelland, Dr. John, iii
mc-clellandi, Barbus, 577
mc-clellandi, Cyprinus, 560
mc-clellandi, Semiplotus, 550
meaco, Labrus, 396
mean-candee, 552
medinilla, Balistes, 691
medius, Trichiurus, 200
megachir, Serranus, 13
Megalaspis, 210, 211
Megalepis, 119
megalepis, Barbus, 564
Megalops, 624, 650
megalops, Pseudeutropius, 472, 473
megaloptera, *Ilisha*, 645
megaloptera, Pellona, 642, 645
megalopterus, *Platygaster*, 645
megalura, Setipinna, 627
Megarasbora, 583, 584
megastoma, Thryssa, 628
megastomus, Opsarius, 594
Megraprotodon, 103
Meladerma, 256
melampygus, *Carangus*, 214
melampygus, Caranx, 214
melanampyx, Barbus, 558, 570
melanampyx, *Labeo*, 570
melanampyx, *Puntius*, 570
melanocephalus, Gobius, 292
melanochir, Mugil, 359
melanoderma, Clarias, 484
melanophrys, Myripristis, 170
melanoptera, Alepes, 225
melanopterus, Carcharias, 711, 715
melanopterus, Eleotris, 315
melanopterus, Hemigymnus, 396
melanopterus, Panchax, 523
melanopterygius, Arius, 459
melanorhynchos, Apogon, 58
melanorhynchus, Apogon, 58
melanorhynchus, Arothron, 704
melanosoma, Gobius, 297
melanosoma, *Paragobiodon*, 297
melanospilos, Hippocampus, 682
melanospilos, Holocentrum, 173
melanospilos, Tæniura, 740
melanostethos, Caranx, 220
melanosticta, Gobius, 290
melanostigma, Atherina, 344, 345
melanostigma, Barbus, 558, 573
melanostigma, Belone, 409
melanostigma, Pseudosynanceia, 163
melanotænia, Lutjanus, 36
melanotus, Belone, 510
melanotus, Chætodon, 108
melanotus, Gomphosus, 406
melanotus, *Mastacembelus*, 510
melanura, Clupea, 635, 641
melanura, Genyoroge, 43
melanurus, Acanthurus, 202, 206
melanurus, *Acronurus*, 206
melanurus, *Alausa*, 641
melanurus, Amphiprion, 379
melanurus, Belone, 510
melanurus, Harengula, 636
melanurus, Pachypterus, 472
melapteronotus, Labrus, 396
melapterus, Hemigymnus, 395
melapterus, *Hemiulis*, 396
melapterus, *Labrus*, 396
melapterus, *Tautoga*, 396
melas, Bagrus, 445
melasoma, Clarias, 484
melas, Plesiops, 128
melastigma, Haplochilus, 522
melastoma Clupea, 643, 644
melastoma, Pellona, 644
meleagris, Chærops, 391
meleagris, Etroplus, 415
meleagris, *Gymnothorax*, 668
meleagris, Muræna, 667, 668
meleagris, Ostracion, 696
meleagris, *Thyrsoidea*, 668
Meletta, 634
melettinus, Amblypharyngodon, 554, 555
melettinus, *Leuciscus*, 555
Melichthys, 686
Mene, 249
Menephorus, 8, 9

meniscus, Julis, 404
menisorrah, Carcharias, 711, 716
menoda, *Bagrus*, 446
menoda, Macrones, 446
menoda, *Pimelodus*, 446
mentalis, *Scarus*, 413
Menticirrhus, 181
mento, Chanos, 651
mento, Exocœtus, 518, 520
mento, *Parexocœtus*, 520
mentum, *Trichopodus*, 372
merra, *Epinephelus*, 13, 14, 746
merra, *Holocentrus*, 14
merra, Serranus, 13, 14, 746
mertensii, Caranx, 225
mertensii, Chætodon, 105, 747
mertensii, Julis, 404
mertensii, *Tautoga*, 396
Mesoprion, 29
Mesopristis, 71
metallicus, *Diacope*, 32
mette-mirrei, 95
micracanthus, *Capoeta*, 530, 531
micristius, 521
microbuglossus, 425
Microcanthus, 103
microcephalus, *Leuciscus*, 584
microphthalmus, Macrones, 443, 446
microcephalus, Ophichthys, 664, 665
microcephalus, Schizothorax, 532
microcephalus, *Silurus*, 476, 487
microcephalus, *Triurus*, 506
microcephalus, *Wallago*, 477
microdon, *Collichthys*, 194
microdon, *Otolithus*, 194
microdonophis, 663
microdon, Pristis, 729
microdon, *Sciœna*, 194
microdon, Sciænoides, 194
microgastropterygius, Arius, 459
micrognathus, *Scarus*, 413
microlepidota, *Rohita*, 537
microlepidotus, Labeo, 537
microlepidotus, Scomber, xv, 250, 747
microlepis, *Alausa*, 639
microlepis, Amblypharyngodon, 554, 555
microlepis, *Johnius*, 185
microlepis, *Leuciscus*, 555
microlepis, *Pseudosciœna*, 185
microlepis, Rohtee, 525
microlepis, *Systomus*, 587
microlepis, *Osteobrama*, 587
microlepis, Toxotes, 117
Micromesus, 743
Micromugil, 521
Microneme, 475
micronema, Danio, 596
micronotacanthus, Arius, 460
micropeltes, Ophiocephalus, xiii, 363, 365
Microphis, 679
microphthalma, Narcine, 733
microphthalmus, *Eutropius*, 471
microphthalmus, *Gastrophysus*, 702
microphthalmus, Labeo, 542, 748
microphthalmus, *Tetrabranchus*, 657
micropogon, *Acanthopsis*, 610
micropogon, Barbus, 563
micropogon, Barbus, 557, 563
micropogon, Batrachocephalus, 468
micropogon, *Cirrhina*, 536
micropogon, Schizothorax, 532
microprion, *Epinephelus*, 26
microprion, Serranus, 26
microps, Carcharias, 716
microps, *Cobitis*, 616
microps, Harpodon, 506
microps, *Laurida*, 505
microps, Nemachilus, 616
microps, Saccobranchus, 486
microps, *Salmo*, 505
micropteri, Cypsiluri, 518
micropterus, Exocœtus, 518
micropterus, Gymnomuræna, 674
micropterus, *Murœna*, 674
Micropteryx, 226
Micropus, 158, 747
Micropus, 226
micropus, Pellona, 644
Microsicydium, 298
microspathodon, 384
microstoma, *Conger*, 664
microstoma, *Lutjanus*, 74
microura, *Dasyatis*, 741
micrura, Pteroplatea, 741
micrura, *Raja*, 741
micruropterygius, Arius, 460
mile-lo-ah, 584
milesi, Cirrhina, 547
miles, *Corvina*, 185
miles, Holocentrus, 185
miles, *Johnius*, 185
miles, *Macrochyrus*, 153
miles, *Pseudosciœna*, 185
miles, Pterois, 152
miles, Pterois, 153
miles, Sciæna, 185
miles, *Scorpœna*, 153
miliaris, Chætodon, 747
militaris, *Ageniosus*, 469
militaris, *Arius*, 469
militaris, Osteogeniosus, 469
militaris, *Silurus*, 469
milk fish, 651
millepunctata, Percis, 263
miltostigma, *Epinephelus*, 26
miltostigma, Serranus, 26
miniata, *Diacope*, 24
miniata, *Perca*, 24
miniatus, *Bodianus*, 24
miniatus, *Cromileptes*, 24
miniatus, *Epinephelus*, 24
miniatus, Serranus, 24
minimus, *Ophisurus*, 664
mino, *Ageneiosus*, 468
mino, Batrachocephalus, 468
minor indicus, *Harengula*, 637
minor, *Monoceros*, 209
minor, Murœna, 669
Minous, 159
minous, *Apistus*, 159
minuta, *Equula*, 244
minuta, Gazza, 244
minutus, *Cestreus*, 316
minutus, *Scomber*, 244
Mionorus, 56
miops, Ambassis, 55
mirrgah, 548
mirum, *Calloptilum*, 418
Misgurnus, 609
mitchelli, *Mesoprion*, 94
mitchelli, Pseudeutropius, 473
mitis, Balistes, 686, 689
moa. Anguilla, 660
moadetta, Chorinemus, 230
moah, 555
moa, *Murœna*, 660
Mobula, 744
mochhna, 541
modesta, *Mayoa*, 528
modestum, Glyptosternum, 499
modestus, Barbus, 579
modestus, Barilius, 589
modestus, Chatoessus, 632, 633
modestus, Discognathus, 527, 528
modestus, Glyphidodon, 385, 388
modestus, Periophthalmus, 303
modestus, *Puntius*, 579
modestus, Semiplotus, 550
mogang-voral, 246
moh, 653
mohaylee, 540
moh-do-nee-konah, 598
Mola, 554
mola, 583
mola, Amblypharyngodon, 554, 555
mola, *Cyprinus*, 555
mola, *Julis*, 398, 399
mola, *Leuciscus*, 555
molendinaris, Muræna, 673
mol-kotah, 691
moluccanus, *Odax*, 409
moluccanus, Pseudodax, 409
molucca, Pempheris, 175
moluccensis, Clupea, 636
moluccensis, *Harengula*, 636
moluccensis, Hippocampus, 682
moluccensis, *Thynnus*, 230
Monacanthus, 684, 692
monangoo, 625
monckei, Hippocampus, 682
mon-e-o-ree, 589
mong, *Bagrus*, 463
monaceros, *Balistes*, 694
monoceros, 208
monoceros, *Aleuteres*, 693
monoceros, *Alutera*, 693
monoceros, *Balistes*, 693
monoceros, *Cobitis*, 615
monoceros, *Harpurus*, 209
monoceros, Monacanthus, 692, 693
monoceros, Nemacheilus, 612, 615
monochrous, *Gymnothorax*, 672
monochrous, Salarias, 329
monodactyla, *Scorpœna*, 159
Monodactylus, 234
monodactylus, *Apistes*, 159
monodactylus, Minous, 159
monogramma, *Scolopsides*, 85
monogramma, *Scolopsides*, 86
monogramma, Scolopsis, 86
Monoprion, 56
Monopterhinus, 723
Monopterus, 655, 656
monostigma, *Diacope*, 39
monostigma, *Lujanus*, 39
monostigma, *Mesoprion*, 39
monostigma, *Mesoprion*, 42
Monotretus, 699
monstrosa, *Scorpœna*, 162
montana, *Cobitis*, 616, 617
montana, *Schistura*, 616
montanus, *Bagrus*, 449
montanus, Macrones, 443, 449
montanus, Nemacheilus, 613, 616
montanus, Nemachilus, 617
montanus, Ophiocephalus, 367
mookarah tenkee, 742
moolean, 685
moollan tiriki, 736
moollu plachay, 708
mooloo alley, 652
moonda-kun-kakasi, 170
moonda-kun-kilchi, 214
moonjilli, 392
mookalee, 233
mookalee-parah, *Scomber*, 234
mookalee, Trachinotus, 234
moorghee, 483
mooroo-bontoo, *Scorpœna*, 151
moo-roo-kee-dah, 140
mooskoom-parah, 227
mootah, 204
mootahree, 129
mootah, *Chœtodon*, 204
morah, 543
mor-ah-kee, 548
morala, *Cyprinus*, 541
morala, Labeo, 541
moran candai, 650
morar, 585
morara, 555, 585
morar, Aspidoparia, 585
morar, *Cyprinus*, 585
morarensis, Barilius, 591
morar, *Leuciscus*, 585
morari, 585
morah, *Morara*, 585
morch, *Cobitis*, 614
Moringua, 658, 666
Moronophis, 67
morrhua, Serranus, 21
mor-ri-ah, 598
Morulius, 534
morrul, 366
mosal, Barbus, 565
mosal, *Cyprinus*, 564
mosal, *Labeobarbus*, 563
mosoo, 537
mossambicus, Synguathus, 678
motius, *Clupanodon*, 643
motius, *Clupea*, 643
motius, Pellona, 645
motius, Pellona, 642, 643
motta, Elacate, 256
mottechi, 345
motti kola kende, 345
motusi, 472
mou-ah, 585
moucheté, Tetrodon, 705
mowa, Anguilla, 660
Mrigala, 547, 548
mrigala, Cirrhina, 547, 548
mrigala, *Cyprinus*, 547
mucknee, 50, 587
muddeeru, 633
muddu candai, 634
mudi-bom-mi-day, 340
mud skate, 730
mud-skippers, 303
mugah, 618
mugah, Nemacheilus, 618
Mugil, 346
MUGILIDÆ, 346
mukhan sorrah, 715
muk-ka, 602
mukni, 555
mukul jellah, 444
mul-la, 480
mulleer, 448
mulleri, Carcharias, 711, 713
mulleri, Carcharias, 716
mulleri, Nebrius, 725
mulleri, *Silurus*, 480
mulleri, Wallagoo, 480
MULLIDÆ, 119
Mulloides, 122
mullya, *Chondrostoma*, 527
mullu-cheru, 52
mullu-jubbu, 52
Mullupeneus, 123
mullu-tharu, 52
multibarbis, Choridactylus, 161
multibarbis *Chorismodactylus*, 161

multicolor, *Apistes*, 157
multidens, *Anthias*, 27, 746
multidens, Aprion, 746
multidentata, *Ptyobranchus*, 666
multifasciata, *Æsopia*, 430
multifasciata, Synaptura, 428, 430
multifasciatus, Nemacheilus, 613, 617
multifasciatus, Synaptura, 430
multiradiatus, Plotosus, 482
multitæniatus, Apogon, 57, 66, 101
multifasciatus, *Mullus*, 124
multifasciatus, *Parupeneus*, 124
multifasciatus, Upeneus, 124
multiocellatus, Antennarius, 271
mulvel, 536
munduttee, 561
mungee wahlah, 478
mungil-cullawah, 15
mungil yata, 443
mungi-mapudi, *Sparus*, 40, 41, 43
mun-glee-ah-nee, 489
mungo-park, Balistes, 688
munja cooli min, 109
Muræna, 659, 667
Muræna, 338, 659
Murænesox, 658, 661
Murænidæ, 655, 658
Murænichthys, 658, 663
Murænidæ engyschistæ, 659, 667
Murænidæ platyschistæ, 658, 659
Murænoblenna, 674
Murænophis, 667
Murænopsis, 663
muralis, *Eleotrioides*, 311
muralis, Eleotris, 310
muralis, *Valenciennea*, 311
murdjan, Myripristis, 170
murdjan, *Perca*, 170
murdjan, *Sciæna*, 170
muricata, Pterois, 153
muricatus, *Lophius*, 273
murius, *Bagrus*, 472
murius, *Eutropius*, 472
murius, *Pimelodus*, 472
murius, Pseudeutropius, 471, 472
muri vacha, 472
murl, 366
musalli, 84
musiha, *Cyprinus*, 541
mussara, 126
mussoassah, 129
mussulah, Barbus, 565
Mustelina, 710, 720
mustelus, 710, 720
muticus, Trichiurus, 200
muti jella, 447
mu-took-dah, 312
muttah, 368
mutta tirke, 744
mutthi, 636
Mycteroperca, 8, 9
Myctophum, 506, 507
Myliobatidæ, 727, 742
Myliobatis, 742
mylio, *Sparus*, 141
myl-meen, 199
Mylorina, 743
myops, *Salmo*, 504
myops, Saurus, 503, 504
myops, *Synodus*, 504
myriaster, *Mesoprion*, 37
myriaster, Serranus, 24

Myriodon, 747
Myripristis, 169
myrus, *Muræna*, 662
mysorensis, Barbus, 563
mysorensis, *Cobitis*, 610
mysoricus, *Perilampus*, 595
mysoricus, *Silurus*, 476, 477
mystacina, *Clupea*, 627
mystacoides, Engraulis, 625
mystax, *Clupea*, 625
mystax, Engraulis, 624, 625
mystax, Engraulis, 627
mystax, *Stolephorus*, 625
mystax, *Thryssa*, 625
Mystriophis, 664
Mystus, 630, 653

naambu, 14
nabat, 128
nageb, Pristipoma, 746
naharn, 565, 650
nah kelletee, 473
nah-lah-ku, 431
nai-kerruchi, 31
naim, 548
nair-meen, 7
nalaka, *Hippoglossus*, 422
nala-sandawah, Stromateus, 247
nalla dindi, 730
nallah jellah, 465
nalla-katchelee, *Corvina*, 187
nalla temeree, 733
nalua, Ambassis, 53
nalua, Ambassis, 54
nalua, *Chanda*, 53
nama, Ambassis, 50, 52
nama, *Bogoda*, 50
nama, *Chanda*, 50
namah-parah, 225
nama-panni, 23
nancar, *Cirrhinus*, 536
nancar, *Cyprinus*, 536
nandi butchua, 490
Nandidæ, 127
nandin, 535
Nandina, 128
Nandina, 534
nandina, *Cirrhinus*, 535
nandina, *Cyprinus*, 535
nandina, Labeo, 535
nandina, *Rohita*, 535
Nandioides, 127
nandioides, *Catopra*, 131
Nandus, 129
nandus, *Coius*, 129
Nangra, 493
nangra, *Macrones*, 494
nangra, *Pimelodus*, 494
naolli, 292
Narcine, 733
narinari, 743
narinari, *Myliobatis*, 743
narinari, *Raja*, 743
narinari, *Stoasodon*, 743
naritus, *Chonerhinus*, 699
naritus, *Tetrodon*, 699
Naseus, 202
Naseus, 208
nashii, *Barbus*, 552
nashii, Scaphiodon, 551, 552
nasica, *Clupanodon*, 634
Naso, 208
nasus, *Acanthurus*, 208
nasus, Chatoessus, 632, 634
nasus, *Clupea*, 634
nasus, *Corvina*, 187
nasus, *Dorosoma*, 634
nasus, Ostracion, 695, 696
nasus, Schizothorax, 532

nasus, Sciæna, 187
nasuta, *Netuma*, 463
nasuta, *Platycara*, 527
nasutus, Arius, 463
natsooli, 267
nattoo, 629
Nauclerus, 228
Naucrates, 228
naucrates, Echeneis, 257
nauphela, Pseudorhombus, 424
na-vettee, 320
Nebrius, 725
nebulo-punctatus, Gobius, 294
nebulosa, Anguilla, 659
nebulosa, Botia, 606
nebulosa, Muræna, 668, 673
nebulosa, Saurida, 504, 505
nebulosa, *Sciæna*, 136
nebulosus, Callichrous, 476
nebulosus, Cheilinus, 394
nebulosus, *Dentex*, 505
nebulosus, Gobius, 288
nebulosus, *Gymnothorax*, 673
nebulosus, *Julis*, 400
nebulosus, Lethrinus, 136
nebulosus, Nandus, 130
nebulosus, Platyglossus, 398, 400
nebulosus, Serranus, 17, 19
neddean jabbu, 584
neela katurnee, 443
neela-panni, 23
nee much, 490
neglecta, *Scorpæna*, 150
neglectus, Hemiramphus, 515, 517
neglectus, Platycephalus, 275
nehereus, Harpodon, xvi, 505, 506
nehereus, *Osmerus*, 505
nehereus, *Saurus*, 506
neilgherriensis, Danio, 595, 597
neilgherriensis, *Paradanio*, 597
neilgherriensis, Rasbora, 584
Neill, A. B., Esq., vii
Neill, Capt., vi
neilli, Barbus, 558, 569
neilli, *Corvina*, 188
neilli, Cossyphus, 392
neilli, Gobius, 290
neilli, Osteochilus, 545
neilli, Pristipoma, 75
neilli, Rohtee, 586
nella, Arius, 458, 465
nella-katchelee, *Labrus*, 189
nella, *Pimelodus*, 465
nella vekal sorrah, 715
Nemacheilus, 605, 612
Nemachilichthys, 605, 611
Nematagnus, 747
Nemipterus, 90
Nemophis, 336, 337
nenga, Arius, 457, 458
nenga, *Pimelodus*, 458
neoguinaica, Albula, 649
neohowii, Clupea, 638
neohowii, *Sardinella*, 636
Neosebastes, 149
Neoscopelus, 506
nepalensis, Mugil, 352
nepura, 540
Nerophis, 676, 680
nesogallica, Pempheris, 175
nesogallicus, *Chironectes*, 272
nesogallicus, Engraulis, 626
Netasomata, 680
nettee-kunla-mottah, 307
netteli, 602, 629
Netuma, 456
netuma, Arius, 463

netuma, *Bagrus*, 463
netuma, *Netuma*, 462
neucrates, Echeneis, 257
nga-ain, 368
nga-ain-di, 366
nga-beh-byoo, 555
nga-byans-ma, 370
nga-chong, 560
nga-congree, 250
nga-dane, 537
nga-dan-gah, 237
nga-doung-zee, 584
nga-gyee 487
nga-gyein, 548
nga-hoo, 537
nga-hpeh, 653
nga-hpyen-boo, 585
nga-hpeh-oung, 587
nga-hpan-ma, 587
nga-htway, 454
nga ike, 446
nga joung, 444
nga-khon-ma, 571
nga-khoo, 485
nga-khoon-ma, 579
nga-khon-mah-gyee, 560
nga-koon-nyat, 600
nga-kouk-thwa, 453
nga-koun-ma, 52
nga-kya, 96
nga-kyee, 487
nga-kyin, 548
nga-kyouk-pah, 452
nga-lay-toun, 576
nga-la-wah, 593
nga-leh, 545
nga-loo, 541
nga-lowah, 571
nga-lyk-pya, 113
nga-man-dan, 598
nga-ma-way-doh-wettung, 339
nga-maway-doh-nga, 338, 340
nga-mee-loung, 128
nga-me-loung, 598
nga-myen-kouban, 490
nga-myit-chin, 538
nga-myit-tsan-nee, 538
nga-nan-joung, 492
nga-nauch-youn, 584
nga-nek-pya, 536
nga-ne-pyah, 535
nga-net-hya, 587
nga-noo-than, 536
nga-ohn-don, 535
nga-ong-tong, 536
nga-pá-nee, 43
nga-pan-ma, 555
nga-pa-thoomg, 114
nga-pay, 537
nga-paying-ki, 276
ngapee, xii
nga-phe, 653
nga-phyin-gyan, 598
nga-phyin-thaleb, 374
nga-phoung-yo, 517
nga-pin-thick-kouk, 374
nga-pok-thin, 187
nga-poongna, 176
nga-pouss-was, 194
nga-pree-gryn, 96
nga pri, 370
nga-prong-gryn, 117
nga-pron-ka, 165
nga-pus-soond, 235
nga-rui, 265
nga-sabasa-sa, 69
nga-sa-ring, 448
nga-sheen, 656
nga-shengna, 116

nga-ta-dun, 187
nga-tan-youet, 650
nga-ta-zee, 576
nga-tha-boh, 295
nga-tha-dyk, 7
nga-thaing, 553
nga-thak-how, 96
nga-tha-lay-doh, 607. 608, 610, 611
nga-tha-louk, 640
nga-that-to, 453
nga-towktoo, 19
nga-towktoo-shweydoo, 18
nga-wah, 140
nga-wet-ma, 96
nga-wet-sat, 98
nga yan dyne, 363
nga-yeh, 466
nga-yin-pounsa, 535
nga-young, 458, 466
nga-zen, 354
nga-zen-zap, 555
nga-zin-byoon, 583
nga-zin-yine, 448
nga-zin-zat, 52
nga-zin-zine, 447
nicobarcensis, *Chætodon*, 112
nicobariensis, Holacanthus, 112
nieuhofii, Echeneis, 258
nieuhofii, Myliobatis, 742
nieuhofii, *Raja*, 742
nieuhofi, Triacanthus, 685
niger, *Apistus*, 156
niger, Balistes, 686, 688
niger, Balistes, 692
niger, *Culius*, 313
niger, *Erythrodon*, 692
niger, *Gymnapistes*, 156
niger, Gymnapistus, 156
niger, *Prosopodasys*, 156
niger, *Pyrodon*, 692
nigerrima, *Meladerma*, 256
niger, Scomber, 256
niger, Schizothorax, 531
niger, Stromateus, 247
niger, *Xenodon*, 692
niger, *Zenodon*, 692
nigra, Elacate, 256
nigra, Eleotris, 313
nigra, Muræna, 668, 674
nigrescens, Callichrous, 478
nigrescens, Caranx, 211, 223
nigrescens, *Halichœres*, 399
nigrescens, Labeo, 535, 536
nigrescens, *Labrus*, 399
nigrescens, Platyglossus, 399
nigricans, Apogon, 58, 59
nigricans, Chætodon, 205
nigricans, Ophiocephalus, 365
nigricans, *Pharopteryx*, 128
nigricans, Plesiops, 128
nigricans, *Scarus*, 413
nigriceps, Serranus, 14
nigripes, Caranx, 221
nigripinnis, *Amia*, 61
nigripinnis, Apogon, 60
nigripinnis, Apogon, 63
nigripinnis, Caranx, 225, 747
nigripinnis, *Epinephelus*, 25
nigripinnis, Labeo, 535, 544
nigrofasciata, Seriola, 227, 228
nigrofasciatus, Barbus, 559, 578
nigrofasciatus, *Barilius*, 597
nigrofasciatus, Danio, 595. 597
nigrofasciatus, *Nomeus*, 227
nigrofasciatus, Serranus, 26
nigrofuscus, Acanthurus, 205
nigrofuscus, *Chœtodon*. 205
nigromaculata, *Apterigia*, 656
nigromarginatus, Opisthognathus, 266
nigropunctatus, *Crayracion*, 704
nigropunctatus, Tetrodon, 700. 704
nigroviridis, Tetrodon, 707
nigrum, Diagramma, 78
nigrum, Pristipoma, 78
nillum koranjan, 261
nilusu, 573
nil-talapat-girawah, 406
nitidus, Antennarius, 272
nitidus, *Polotus*, 74
niveatus, Tetraodon, 702
nobilis, *Ctenops*, 372
nobilis, *Lates*, 7
nobilis, Osphromenus, 372
nobilis, *Racomda*, 532
nobilis, Schizothorax, 532
nobilis, *Trichopodus*, 372
noct, Sargus, 133
noir, *Baliste*, 692
NOMEIDÆ, 747
nooleni, 35, 36
noonah, 634
noordzieki, *Amia*, 101
noordzieki, Apogon, 57, 101
noree nalaka, 421
notata, Apogon, 64
notata, *Genyoroge*, 41
notata, *Genyoroge*, 46
notata, *Platycara*, 528
notatus, Ambassis, 52
notatus, Callichrous, 478
notatus, Glyphidodon, 385, 386
notatus, *Lutjanus*, 41
notatus, Synagris, 93
notatus, *Zeus*, 241
NOTIDANIDÆ, 709, 723
Notistium, 198
notophthalmus, *Julis*, 399
notopsis, Platyglossus, 397, 398
notopsis, *Julis*, 398
NOTOPTERIDÆ, 438, 653
Notopterus, 653
notopterus, *Gymnotus*, 653
notostigma, Nemacheilus, 613, 618
nototænia, Scolopsis, 85
nouleni, *Serranus*, 36
nouleny, *Serranus*, 35
Novacula, 390, 401
novacula, Chela, 603
novacula, *Leuciscus*, 603
Novaculalichthys, 401
novacula, Pellona, 643
novaculoides, *Xirichthys*, 409
noveboracensis, Naucrates, 229
novemfasciatus, Apogon, 59, 60
novemmaculatus, Diodon, 708
novem-radiatus, *Gobius*, 304
novem-radiatus, Periophthalmus, 304
novemstriatus, *Apogon*, 66
no-woo, 499
nubila, Muræna, 671
nuchalis, Amphacanthus, 168
nuchalis, Chanos, 651
nuchalis, Equula, 241
nuda, Trygon, 736
nuddee-meen, 7
nudus, Chirocentrus, 652
nu-ga-dee, 540
nukta, *Cyprinus*, 543, 552
nukta, Labeo, 524, 535, 543
nulla-gandu-menu, 536
nullah-ramah, 301
nullatan, 295
nulla-torriti, 115
nullian sorrah, 712
nullie, 487
nummifer, Antennarius, 271, 272
nummifer, *Chironectes*, 272
nuna-mottah, Gobius, 286
nuna tenggara, 445
nune-parah, 220
nung-grore, 499
nunus, Gobius, 297
Nuria, xiv, 582, 604
nus-sah-rue, 200
nutchar-char, 114
nut-tiah, 176
nya-kya-ma, 117
Nyctophus, 506

obesus, Triænodon, 720
obliteratus, *Alutarius*, 693
oblonga, Ambassis, 50, 51, 52
oblonga, Equula, 243
oblonga, *Salmophasia*, 603
oblongus, *Amblyrhyncotus*, 702
oblongus, *Carangoides*, 222
oblongus, Caranx, 211, 222
oblongus, Gerres, 98, 99
oblongus, *Physogaster*, 702
oblongus, Tetrodon, 699, 700, 702
oblongus, Trachinotus, 233
obscura, *Acoura*, 619
obscurum, Pelor, 161
obscurus, Therapon, 70
obtusata, Sphyræna, 342. 343
obtusirostris, Exocætus, 519
obtusus, Discognathus, 528
obtusirostris, Eutropius, 470
obtusus, Rhinobatus, 731
oceanicus, *Holocentrus*, 15
oceanicus, Serranus, 16
ocellaris, Amphiprion, 379
ocellata, *Cobitis*, 614
ocellatus, *Anosmius*, 707
ocellatus, *Canthogaster*, 708
ocellatus, Gobius, 287
ocellatus, *Platax*, 109
ocellatus, *Psilonotus*, 708
ocellatus, Tetrodon, 707
ocellicauda, *Philypnus*. 309
octofasciatus, Chætodon, 108, 109
octolineata, *Diacope*, 33, 46
octolineatus, Chætodon, 108
octolineatus, *Mesoprion*, 46
octolineata, *Paramia*, 66
octovittata, *Diacope*, 33
octovittata, *Genyoroge*, 33
octovittatus, Cheilodipterus, 66
oculata, *Cobitis*, 608
oculatus, *Bagrus*, 448
oculatus, Balistes, 688
oculatus, *Canthidermis*, 688
oculatus, Macrones, 443, 448
Ocyurus, 29
Odax, 409
Odontamblyopus, 316
Odontaspis, 722
Odonteleotris, 309
Odontobutis, 309
Odontogobius, 282
Odontonectes, 94
ocur, Mugil, 347, 353
ogilbii, *Abramis*, 588
ogilbii, *Osteobrama*, 586, 588
ogilbii, Rohtee, 586, 588
ogilbii, *Systomus*, 588
Ognichodes, 316
oil sardine, 623, 636
olfax, Osphromenus, 372
oligacanthus, Chætodon, 109
oligacanthus, *Parachætodon*, 109
oligodon, Pseudorhombus, 424
oligolepis, Anabas, 370
oligolepis, *Arelia*, 433
oligolepis, Cynoglossus, 432, 433
oligolepis, Megalops, 650
oligolepis, Mugil, 348, 358
oligolepis, *Plagusia*, 433
Olistus, 210
olivaceum, Pristopoma, 73
olivaceus, *Canthophrys*, 609
olivaceus, Mugil, 348, 357
olivaceus, Naseus, 209
Olyra, 441, 474
Ompok, 475
oo-chra-dah, 235
oodan, 98
oolan, 133
oolaree, 555
oolee perlee, 574
oolim-parah, 220
ooloo-way, 295, 505
ool-pa-thy, 276
oolum, 640, 641
oontoo-mossal, 296
oordah, 174
oorialli, 631
oorookoolti sorrah, 725
ooshee-collarchee, 512
oo-suf-foo, 315
opercles, serrations of, 9
operculare, Pristipoma, 76
opercularis, Callionymus, 321, 323
opercularis, Lethrinus, 136
Ophicardia, 656
Ophichthys, 658, 663
OPHIDIIDÆ, 417, 419
Ophidium, 661
Ophiocara, 309
ophiocephala, *Ophiocara*, 312
OPHIOCEPHALIDÆ, xv, 362, 439
OPHIOCEPHALIDÆ, breeding of, 362
Ophiocephalus, x, 363, 489
ophiocephalus, Eleotris, 312
ophicephalus, *Philypnus*, 309
ophiodon, *Sauridichthys*, 506
ophiodon, *Saurus*, 506
Ophioscion, 184
ophis, Muræna, 673
Ophisoma, 660
Ophisternon, 657
ophis, *Thœrodontis*, 673
Ophisuraphis, 664
Ophisurus, 663
Ophthalmolepis, 407
ophuysenii, *Mesoprion*, 46
Opistbognathus, 266
Opisthonema, 634
Opisthopterus, 623, 646
Opistocheilus, 531
Opisotomus, 202
Oplopomus, 282
Opsaridium, 588
Opsarius, 588
o-pul-dah, 648
oranim, Teuthis, 168
orbicularis, *Amia*, 65
orbicularis, Apogon, 65
orbis, *Chœtodon*, 115, 236
orbicularis, Platax, 236
orbis, Ephippus, 115
orbis, *Ilarches*, 115
Orcynopsis, 253
Orcynus, 251
Oreias, 612
Oreini, sometimes unwholesome, 533

Oremus, xiv, 529, 604
orientale, Diagramma, 80
orientale, Holocentrum, 172
orientalis, *Anthias*, 80
orientalis, *Brachirus*, 429
orientalis, Callionymus, 321, 323
orientalis, Channa, 368
orientalis, Chanos, 651
orientalis, Dactylopterus, 279
orientalis, *Dalophis*, 665
orientalis, Grammistes, 28
orientalis, Ophichthys, 664, 665
orientalis, Pelamys, 253
orientalis, *Plectorhynchus*, 80
orientalis, *Pleuronectes*, 429
orientalis, Rhynchobdella, 338
orientalis, *Serranus*, 80
orientalis, *Sphagebranchus*, 665
orientalis, Synaptura, 428, 429
ornatissimus, Balistes, 691
ornatissimus, *Herpetoichthys*, 665
ornatissimus, Ophichthys, 664, 665
ornatissimus, *Rhinecanthus*, 691
ornatum, *Scyllium*, 726
ornatus, Balistes, 694
ornatus, Gobius, 294
ornatus, Gomphosus, 406
ornatus, Lethrinus, 137
ornatus, Notopterus, 654
ornatus, *Rhynchichthys*, 171
ornatus, Scatophagus, 114, 115
o-ro-tam-dah, 19
orthorhynchus, *Hippoglossus*, 422
oryx, Salarias, 332
Osmobranchus, 326
Osphromenoidei, 369
Osphromenoides, 127
Osphromenus, 371
Osphromenus, breeding of, 372
Osphromenus, nests of, 372
osseus, Sciæna, 193
osseus, Tholichthys, 102, 103
Osteobrama, 586
Osteochilus, 545, 604
Osteogeniosus, 440, 469
osteographus, *Leuciscus*, 595
osteographus, *Perilampus*, 595
Ostracion, 684, 695
OSTRACIONTINA, 684, 694
otaitensis, Pempheris, 175
Otolithus, 195
ottah, 165
ovalis, Centronotus, 234
ovalis, *Solea*, 429
ovaree candee, 584
ovata, Solea, 425, 426
ovata, Solea, 426
ovatus, *Gasterosteus*, 234
ovatus, Trachynotus, 234
owenii, Chela, 602
owenii, *Leuciscus*, 602
owenii, *Pelecus*, 602
Owen, Professor, vii
Oxycheilinus, 393
oxycephala, Scorpænopsis, 150
oxycephalus, *Scorpæna*, 150
Oxycirrhites, 144
Oxygaster, 599
Oxymonacanthus, 692
Oxyporhamphus, 512
Oxyrhina, 722
oxyrhynchus, *Conger*, 662
Oxyurichthys, 282
Oxyeleotris, 309
Oxymetopon, 309
oyena, Gerres, 99, 100
oyena, *Labrus*, 99
oyena, *Smaris*, 99
oz-o-la, 592

paarl-coorchee, 242
paatha, 705
pabda, 479
pabda, Callichrous, 476, 479
pabda, *Silurus*, 479
pabda, *Wallago*, 479
pabo, Callichrous, 476, 477
pabo, *Schilbe*, 476
pabo, *Silurus*, 477
pabo, *Wallago*, 478
pachycentrum, Serranus, 25, 26
Pachystomus, 588
pacifica, *Cobitis*, 313
padangensis, Gobius, 294
Pœcilocephalus, 663
pœcilinotus, Serranus, 21
pœcilinotus, Tetraodon, 702
Pœcilophis, 667
pœcilopterum, Diagramma, 82
pœcilopterus, Exocœtus, 518
pœcilura, *Raja*, 741
pœcilurus, *Trygon*, 741
Pagrus, 138
PAGRINA, 134
pah-boh, 477
pahmum kolah, 510
pah-no-dah, 110
pah-noo-dah, 105
pahruah, 585
paikeeli, *Perca*, 73
paikeeli, Pristipoma, 73
painah, 105
painnee-meen, 7
pairatalis, *Chætodon*, 114
pak-tah, 590
PALÆICHTHYES, 709
palah bontah, 651
palasah, 640
palasah, *Alausa*, 640
palasah, Clupea, 640
pala, Chanos, 651
pala sorrah, 712, 713
palasorrah, Carcharias, 712
palin-keetchan, 69
pallasii, Notopterus, 653
pallida, Echeneis, 258
pal sorrah, 716
pallu, 477, 479
palustris, Crocodilus, xii
pama, *Bola*, 193
pama, *Collichthys*, 194
pama, *Sciæna*, 194, 195
pama, Sciænoides, 193, 194
pamboo meen, 658
panaina-kullawaie, 23
pan, *Brachirus*, 429
pancalus, *Macrognathus*, 340
pancalus, Mastacembelus, 339, 340
Panchax, 521
panchax, Aplocheilus, 523
panchax, *Esox*, 523
panchax, Haplochilus, xiv, 522, 523
pandoomenoo, *Perca*, 7
pandu-kopah, 7
pandu-menu, 7
Pangasius, 440, 469
pangasius, *Pimelodus*, 470
pangia, Acanthophthalmus, 610, 611
pangia, *Cobitis*, 610
pangkal, 340
Pangio, 610
pangusia, *Cyprinus*, 541
pangusia, *Gobio*, 54
pangusia, Labeo, 535, 541
pangut, *Rohtee*, 581
pangya, 611
panijus, *Cheilodipterus*, 315, 747
panijus, Sillago, 315
panlong-gryn, 117
panoo-girawah, 396
pan, *Pleuronectes*, 429
pan, *Solea*, 429
pan, Synaptura, 429
pan, Synaptura, 428, 429
pantherina, Gymnomuræna, 674
pantherina, *Sidera*, 673
pantherinus, Cirrhites, 144
pantherinus, *Epinephelus*, 19
pantherinus, *Gymnothorax*, 673
pantherinus, *Holocentrus*, 19
pantherinus, *Ichthyophis*, 674
pantherinus, *Murænophis*, 672
pantherinus, Platophrys, 425
pantherinus, *Rhomboidichthys*, 425
pantherinus, *Rhombus*, 425
pantherinus, Serranus, 19
pantherinus, *Sparus*, 144
pantherinus, Tetrodon, 705
pantouflier, *Squale*, 720
pa-o-char, 585
pa-pa-dah, 201
papillatus, Barilius, 592
papua, Tetraodon, 707
papilio, Periophthalmus, 303
Paracœsio, 94
Paracanthistius, 8
para, Caranx, 220
Parachæturichthys, 282
Paracirrhites, 144
Paradentex, 89
Paradiodon, 708
Parabalistes, 686
Paradanio, 594
paradiseus, *Polynemus*, 176
paradiseus, *Trichidion*, 176
paradoxum, Solenostoma, 676
Paradules, 67
paraga, 555
parah, 231
para korava, 367
Paralaubuca, 599
Paraluteres, 692
Parambassis, 49
Paramia, 65
Paramonacanthus, 692
Paranandus, 130
Paranguilla, 659
Paranthias, 27
Parapercis, 262
Paraplagusia, 431
Parapocryptes, 299
Parascorpœna, 150
para, *Selar*, 220
Paraserranus, 8, 9
Parasilurus, 480
Paratractus, 210
Paratrygon, 736
Pardachirus, 427
pardalis, *Epinephelus*, 13
pardalis, Serranus, 13
pareh, Trygon, 737
Pareleotrini, 281
Pareleotris, 309
Paretroplus, 414
Parexocœtus, 518
pareva, *Aluteres*, 694
Pargobius, 282
parl sorrah, 712
parparaal, 340
parræ, Albula, 649
parrah, Barbus, 558, 572
parrah perlee, 572
parrah, *Puntius*, 572
parrandee, 84
parravay-kolah, 518
parsia, Mugil, 346, 350
parsia, Mugil, 355
Parupeneus, 123
paru, Stromateus, 247
parruvu, 233
parva, Echeneis, 258
parva, *Platygaster*, 643
parvidentata, *Ptyobranchus*, 666
parvipinnis, Arius, 457, 460, 465
parvus, Tetraodon, 704
pastinacoides, Trygon, 737
pa sorrah, 720
pasuwa, 48
patasi, 473
pathi-parah, 226
patia kerundi, 579
patne sootong, 424
patoca, *Leiodon*, 703
patoca, Tetrodon, 700, 703
patoca, Tetraodon, 702
pauni eyri, 370
pausius, *Cyprinus*, 541
pavimanus, *Rhombus*, 425
pavimentata Rita, 454, 455
pavimentatus, Arius, 455
pavonacea, *Cobitis*, 613
pavonaceus, Nemacheilus, 612, 613, 614
pavonina, *Solea*, 427
pavoninus, Achirus, 427
pavoninus, *Pardachirus*, 427
pavoninus, *Pleuronectes*, 427
pavoninus, *Serranus*, 42, 43
Pearl oyster beds injured by skates, 730
pectinatus, Pristis, 729
pectinidens, *Pimelodus*, 468
pectinirostris, *Apocryptes*, 308
pectinirostris, Boleophthalmus, 308
pectinirostris, *Gobius*, 308
pectinopterum, Glyptosternum, 496, 497, 499
pectoralis, Atherina, 344
pectoralis, Gomphosus, 405, 406
peddah-mottah, *Scomber*, 256
peddah poorawah, 628
pedaraki, Mugil, 359
peddaraki sovere, 359
PEDICULATI, 271
Pediculati, 269
peedah, 51
Pegasus, 279
Pegisidæ, 279
Pegusa, 425
pelagica, *Lampugus*, 248
pelamides, *Scomber*, 252
Pelamys, 253
pelamys, *Scomber*, 252
pelamys, Thynnus, 252
Pelates, 68
pellucidus, Amblypharyngodon, 555
pellucidus, *Leuciscus*, 555
Pellona, 623, 642
Pelor, 160
pema, 482
pembili-girawah, 399
Pempheris, 175
pennah, 190
pentacanthus, *Chætodon*, 236
pentacanthus, *Perca*, 28
pentadactyla, *Coryphæna*, 402

pentadactyla, Novacula, 402
pentadactylus, *Hemipteronotus*, 402
Pentaprion, 101
Pentapus, 93
pentophthalmos, Mastacembelus, 338
pepo, Scarus, 412
Peprilus, 246
Percidæ, 5, 6
Percina, 5, 7
Percis, 262
Percoidei, 5, 144, 342
percula, Amphiprion, 378, 379
percula, *Lutjanus*, 379
peregrinus, Pseudophycis, 417
Perilampus, 594
Perilampus, 598, 605
Periophthalmini, 281, 303
Periophthalmodon, 303
periophthalmoides, Gobius, 294
Periophthalmus, 303
periophthalmus, Salarias, 329, 333
perlee, Puntius, 571
permutatus, Heniochus, 110
peronii, Caranx, 216
peronii, *Hemipimelodus*, 467
peronii, *Pimelodus*, 467
peroom-kilché, 95
peroom tiriki, 741
perrotteti, Pristis, 728, 729
persee, 591
perseus, Perilampus, 598
personatus, Gobius, 292
perspicillaris, Tetraodon, 706
petaurista, Caranx, 226
petersii, Tetrodon, 707
petersi, Hapalogenys, 77
petersi, Saurenchelys, 663
Peters, Professor, vi
petiah, 565
Petrometopon, 8, 9
petrophilus, Gonorhynchus, 530
Petroscirtes, 326
pet-toh-ee, 572
pfeifferi, Engraulis, 628
pfeifferi, Muræna, 672
pfeifferæ, Polynemus, 178
pfeifferi, Sidera, 673
pfeifferi, Stolephorus, 628
phœnistomus, Serranus, 27
phœops, *Scolopsides*, 85
phœops, Scolopsis, 85
phaëton, Serranus, 360
Phagorus, 483
phaiopus, Julis, 398
phaiotænia, Julis, 400
phaiotæniatus, Mesoprion, 46
Phalacronotus, 475
phaleratus, Balistes, 687
Pharopteryx, 127
Pharyngognathi, 377
Pharyngognathi malacopterygii, 509
phasa, Clupea, 627
phasa, Engraulis, 627
phayriana, Opicardia, 656
Philypni, 281, 308
Philypnodon, 308
Philypnus, 308
pholicephalus, Opsarius, 600
Pholis, 325
pholoe, 653
phool dhok, 368
phoxocheila, Cobitis, 609
Phtheirichthys, 257
phula, Ambassis, 50
phula, Chanda, 50
phula, *Leuciscus*, 602
phul chela, 602
phulo, Chela, 600, 602
phulo, *Cyprinus*, 602
phutunio, Barbus, 556, 559, 578
phutunio, *Cyprinus*, 578
phutunio, Puntius, 578
phutunio, *Systomus*, 578
phutuni pungti, 578
phymatodes, Scyllium, 726
Physodon, 710, 711, 713
Physostomi, 438
physostomi apodes, 655
pica, Diagramma, 80
pich-ru, 374
picoides, Diagramma, 83
picta, Muræna, 667, 672
picta, *Perca*, 81
pictum, Diagramma, 71, 81, 82, 83, 747
pictum, Lamnostoma, 665
picturata, Alutera, 694
pictus, Chætodon, 105
pictus, Chironectes, 272
pictus, *Grammistes*, 82
pictus, *Gymnothorax*, 672
pictus, *Lutjanus*, 82
pi-i-kee, 480
piindthee, 116
pilah gokundu, 455
pillinchan, 415
pilli-parah, 226
pilosus, Holocanthus, 704
pilot fishes, 229
Pimelepterina, 142
Pimelepterus, 142
Pimelometopon, 391
pimpernau, 658
pinguis, Atherina, 344
pinjalo, Cæsio, 24
pinjalo, *Odontonectes*, 29
pin-la-nga-ba-mah, 128
pinnauratus Barbus, 557, 561
pinnauratus, *Cyclocheilichthys*, 561
pinnauratus, *Puntius*, 561
pinniceps, Antennarius, 271
piscatorius, Leuciscus, 589
piscatorius. Opsarius, 589
piscis, Hystrix, 708
piscis, Monoceros, 209
Pisoodonophis, 664
pittha-kerrundi, 571
pitul kas, 415
plachee, 699
Plagioscion, 184, 193
Plagiostomata, 709
plagiostomus, Oreinus, 529, 530
plagiostomus, Schizothorax, 530
plagiosum, Chiloscyllium, 726
plagiosum, Scyllium, 726
Plagusia, 421, 431
planiceps, Gobius, 296
planiceps, Mugil, 346, 350
planifrons, Gobius, 293
planifrons, Schizothorax, 532
Platacanthus, 609, 611
Platax, 235
platespogon, Pimelodus, 495
Platophrys, 421, 425
Platycara, 525, 527
platycephala, Corvina, 189
Platycephalidæ, 274
Platycephalinæ, 274
Platycephalus, 274
platycephalus, Gobius, 295
Platygaster, 642
Platyglossus, 390, 397
Platygobii, 282
Platygobius, 282
Platypodon, 710
Platypterus, 157
platypterus, Xiphias, 199
Platyrhina, 735
platyrhinum, Holocentrum, 171
Platystacus, 482
platystomus, Arius, 458, 465
Playfair, Col., v.
playfairi, Polynemus, 178
plebeius, Chætodon, 104
plebeius, Polynemus, 179
plebeius, Polynemus, 179
plebejus, Chætodon, 104
plebejus, Polynemus, 179
Plectognathi, 684
Plectorhynchus, 77
Plectroplites, 67
Plesiopina, 127
Plesiops, 127
Pleuronectidæ, 421
pleurotænia, Barbus, 557, 562
pleurotænia, Mullus, 125
pleurotænia, *Puntius*, 562
plinianus, Boleophthalmus, 307
plinianus, Gobius, 307
Plotosus, 441, 482
plumatus, Hemiramphus, 515
plumbea, Cirrhina, 547
plumbea, Citula, 223
plumieri, Albula, 649
plumieri, Diodon, 708
Pneumabranchus, 655, 657
poaree candee, 563
pob-tah, 477
poeti, *Diapterus*, 100
poeti, Gerres, 100
Pogoneleotris, 309
Pogonias, 76
Pogonoperca, 27
poicilus, Mugil, 347, 351
pointillé, Ostracion, 696
pointillé, Tetrodon, 705
poisonous fishes, 269, 699, 705, 706
Polemius, 154
Polistonemus, 176
polleni, *Epinephelus*, 24
pollee makum, 725
polosoo, Caranx, 226
poloosoo-parah, 226
polota, *Coius*, 96
polota, *Datnia*, 96
polota, Datnioides, 96
polum-kala, 180
Polyacanthus, x, xiii, 371
Polycaulis, 163
Polycentroides, 127
polylepis, Scorpæna, 150
polylepis, Sebastes, 150
polylepis, Trygon, 736, 738
polydori, Barbus, 561
polymnus, Anthias, 378, 379
polymnus, *Lutjanus*, 379
polynema, *Chæturichthys*, 286
polynema, Gobius, 286
polynema, *Parachæturichthys*, 286
Polynemidæ, 176
Polynemidæ, 144
Polynemus, 176
polyophthalma, Percis, 263
polyphodophilus, Serranus, 20
polyphodophilus, Epinephelus, 20
polyprion, Scorpæna, 150
polyspilus, Pseudorhombus, 423
polyspilus, Rhombus, 423
polystigma, Amia, 63
polystigma, Apogonichthys, 63
polystigma, Serranus, 21
polytænia, Helotes, 70, 72
polytænia, Hippocampus, 682
polytænia, *Plectorhynchus*, 79
polytænia, Plectorhynchus, 79
polytænioides, Plectorhynchus, 79
Polyuranodon, 667
polyzona, *Echidna*, 673
polyzona, Muræna, 668, 673
polyzonias, Perca, 33
polyzonus, *Pœcilophis*, 673
pomacanthus, Evoplites, 33
pomacanthus, Mesoprion, 33, 46
Pomacentridæ, 377
Pomacentrus, 377, 381
Pomatoprion, 384
Pomatoschistus, 282
pomfret, gray, 247
pomfret, silver, 247
pomfret, white, 246
pom-pi-ah, 50
pompilus, Thynnus, 229
poncha-geraldi, 597
pondiceriana, Elacate, 256
pone keliti, 469
ponticeriana, Colisa, 374
ponticerianus, Ichthyocampus, 679
ponticerianus, Mastacembelus, 340
ponticeranus, Typhlus, 679
ponundi, 374
pooan, 295
poo-dah, 295
pooli-tarate, 116
poollan, 313
poo-meen-candee, 565
poom-tho-cho-rogue-dah, 156
poon-kolal, 228
poo-na-no-dah, 644
poo-nat-tee, 487
poonduouringa, 648
poonduringa, 638
poorawah, 625
poorawah, Engraulis, 625
poorawah, Thryssa, 625
poor-relan, 625
poorwa, 625
poos hee, 726
pootee keintah, 559
pop-pree, 560
po-ra-dah, 114
porawa, Thryssa, 625
porcatus, Balistes, 691
porcellus, Labeo, 535, 539
porcellus, *Tylognathus*, 539
Porobronchus, 658
porocephala, Eleotris, 312
porocephala, *Ophiocara*, 312
porocephaloides, Eleotris, 312
porocephalus, Eleotris, 312, 748
Poroderma, 724
Porogobius, 282
poronotus, 246
porosus, Crocodilus, xii
porphyrocephala, Julis, 403
potah, 560
potail, *Cyprinus*, 539
potail, Labeo, 535, 539
potamophilus, *Arothron*, 707
potamophilus, *Ophisurus*, 664
potamophilus, *Pisoodonophis*, 664
potamophilus, Tetraodon, 707
Potamorrhaphis, 509
po-tang-dah, 138
potous, Arelia, 433

potous, Cynoglossus, 433
potous, *Plagusia*, 433
potravi, 725
pottiah, 579, 580
Pogonognathus, 694
prætextatus, Chætodon, 107
prætextatus, *Julis*, 409
prætextatus, Cymolutes, 409
præusta, *Citula*, 220
præustus, *Carangoides*, 220, 225
præustus, Caranx, 220, 225
prasini, Muræna, 671
praslin, *Perca*, 172
pratbernon, Muræna, 671
Premnas, 377, 380
preopercular spine in immature Lutiani, 29
presbyter, *Leuciscus*, 584
Priacanthichthys, 8, 9
PRIACANTHINA, 48
Priacanthus, 48
priamensis, Salarias, 331
Prilonotus, 699
Priodon, 208
Priodonophis, 667
Prionace, 710
Prionobutis, 309
Prionodon, 710, 711, 714
prismatica, Eleotris, 315
PRISTIDÆ, 727, 728
Pristigaster, 646
pristiger, Pomacentrus, 383
Pristipoma, 72
Pristipomatidæ, 5, 72
Pristis, 728
pristis, Murænesox, 662
pristis, *Squalus*, 728
Pristocantharus, 72
Pristolepis, xiii, 127, 130
Pristotis, 381
Proamblys, 29
Prochilus, 377
progastus, *Oreinus*, 532
progastus, Schizothorax, 532
progenius, Barbus, 564, 565
progenius, *Labeobarbus*, 565
Promécocéphale, 699
Promicrops, 8, 9
prosboscidens, Monocanthus, 694
prosopeion, *Gymnothorax*, 672
prosopeion, Muræna, 672
prosopeion, *Thyrsoidea*, 672
Prosopodasys, 156
prosopotænioides, Pomacentrus, 384
Prostheacanthus, 608
protervus, Congrus, 662
Prospinus, 8, 9
Psenes, 237
Psenes, 747
Psettichthys, 422
Psettodes, 421
Psettoidei, 234
Psettus, 234
Pseudaluteres, 692
Pseudambassis, 49
Pseudamia, 66
Pseudapocryptes, 299
Pseudarius 456
Pseudecheneis, xiii, 442, 500
Pseudetroplus, 414
Pseudeutropius, 440, 470
Pseudobalistes, 686
Pseudobogrus, 442
Pseudobarbus, 556
Pseudochromides, 127
PSEUDOCHROMIDES, 266
Pseudochromidoides, 127
Pseudochromis, 267
Pseudocoris, 407
Pseudodax, 390, 409
pseudomarulius, Ophiocephalus, 363, 364
Pseudomonacanthus, 692
Pseudomonopterus, 149, 747
Pseudomoringua, 666
Pseudomuræna, 667
Pseudopangasius, 469, 470
pseudopterus, *Clupeoides*, 642
pseudopterus, Corica, 642
pseudopterus, *Spratella*, 642
pseudopterus, Tetrodon, 705
pseudopterygius, Caranx, 214
Pseudorhombus, 421, 422
Pseudoscarus, 391, 410
Pseudosciæna, 184
Pseudoserranus, 8, 26
Pseudosilurus, 475
Pseudosynanceia, 163
pseudothyrsoidea, Muræna, 667, 670
pseudothyrsoideus, *Gymnothorax*, 670
Psilocephalus, 694
Psilonotus, 699
psilopteromus, Perilampus, 598
Psilorhynchus, xv, 526, 603
Psilosomus, 316
psittacus, *Scarus*, 412
psittacus, *Sparus*, 142
Pterengraulis, 624
Pterichthys, 154
Pterocyptis, 475
Pterois, 152, 747
Pteroplatea, 736, 741
Pteroleptus, 152
Pteropsarion, 588, 592
Pteropterus, 152
Pterurus, 666
Ptyobranchus, 666
Ptycobarbus, 533, 604
puckelli, Barbus, 558, 574
puckelli, *Puntius*, 574
Puckle, Major, vi
puck-wah-ree, 590
puddu, 50
puducan sorrah, 716
puff fish, 699
pufta, 477
pula chapa, 363
pulchella, Percis, 263
pulchellus, Barbus, 558, 568
pulchellus, Nemacheilus, 612, 615
pulcherrima, Coris, 408
puli tenke, 737
pulla, 640
pullattay, 415
pulli, 116, 653
pulli-cullawah, 14
pu meen, 651
pumilus, *Arius*, 456
pu murl, 363
punctata, Ailiichthys, 489
punctata, Drepane, 116
punctata, Lamna, 722
punctata, Muræna, 667, 669
punctata, Muræna, 668
punctata, Nangra, 494
punctata, *Oxyrhina*, 722
punctata, Percis, 262
punctata, *Schistura*, 616
punctata, *Strophidon*, 668
punctato-fasciatus, *Gymnothorax*, 670
punctatofasciata, Muræna, 667, 669, 670
punctatum, Bregmaceros, 418
punctatum, *Calloptilum*, 418
punctatum, Diagramma, 83, 747
punctatus, *Amphacanthus*, 168
punctatus, *Apocryptes*, 307
punctatus, Barbus, 556, 559, 572, 577
punctatus, *Bagrus*, 445
punctatus, *Blennechis*, 326
punctatus, *Chætodon*, 116
punctatus, Cheilinus, 394
punctatus, *Cibotion*, 696
punctatus, Cirrhites, 144
punctatus, Clarias, 485
punctatus, *Diapterus*, 98
punctatus, Diodon, 708
punctatus, *Ephippus*, 116
punctatus, Gerres, 98
punctatus, *Gymnothorax*, 669
punctatus, *Harpochirus*, 116
punctatus, *Hemibagrus*, 446
punctatus, Macrones, 443, 445
punctatus, Mastacembelus, 340
punctatus, *Omobranchus*, 326
punctatus, *Ophichthys*, 656
punctatus, Ophiocephalus, 364
punctatus, Ophiocephalus, 363, 367
punctatus, Ostracion, 695, 696
punctatus, *Pachypterus*, 490
punctatus, Petroscirtes, 326
punctatus, Platycephalus, 275, 277
punctatus, *Plectorhynchus*, 82, 83
punctatus, Pomacentrus, 382, 384
punctatus, *Puntius*, 577
punctatus, Schizothorax, 532
punctatus, Silurus, 480
puncticeps, Cynoglossus, 432, 437
puncticeps, *Plagusia*, 437
puncticulata, *Ophisurus*, 664
punctillatus, Gobius, 294
punctulata, Novacula, 402
punctulatus, Apogon, 63
punctulatus, *Apogonichthys*, 63
punctulatus, Cheilinus, 394
punctulatus, Glyphisodon, 387
punctulatus, Hippocampus, 682
punctulatus, *Labrus*, 27
punctulatus, *Serranus*, 27
pungella, 560
pungitius, Gasterosteus, 489
punia buchua, 474
punjabensis, Barbus, 559, 580
punjabensis, Chela, 600, 601
punjah, *guggah*, 446
punnah, 371
punni-calawah, 19
punnikowu, 650
pununtlai, 138
punnur, 116
puntang, Gobius, 288
puntangoides, Gobius, 288
puntio, Barbus, 559, 582
puntio, *Cyprinus*, 582
puntio, *Systomus*, 582
Puntius, 556
purava, *Clupea*, 628
purava, Engraulis, 624, 628
purpurascens, Elops, 649
purpurea, Julis, 403, 404
purpurea, *Scarus*, 404
purpureo-lineatus, *Julis*, 401
purpureo-lineatus, Platyglossus, 401
purpureus, *Grammistes*, 404
purpureus, *Labrus*, 404
pur-ran-dah, 595
purrandee, 234
purri, 653
purrooah, 154
purroamee, 110
purrooway sorrah, 712
pur-run-gun, 732
purruwa, 40
purruwah, 245
pusillus, Erethistes, 452
pussai, 628
puta, Therapon, 68, 70
put-tah-re, 473
putitora, *Cyprinus*, 564
put-tas-si, 489
putteriki, 187
putter perlee, 577
putthu-muday, 257
puttiah, 201
put-to-lah, 50
puttoo, 587
puttosi, 474
put-tu-ah, 489
put-tul, 473
puttuli, 489
pu verarl, 363
Pyrodon, 686
pyrrhopterus, Barbus, 576
pyrrhopterus, *Systomus*, 576
pyrrhostethus, Pseudoscarus, 412
python, Muræna, 670

quadragesimalis, Coilia, 630, 631
quadricolor, Julis, 404
quadricornis, *Erpichthys*, 331
quadricornis, Salarias, 329, 331
quadrifasciata, *Amia*, 59
quadrifasciatus, Apogon, 58
quadrifasciatus, Apogon, 59
quadrifasciatus, Glyphisodon, 386
quadrifilis, Coilia, 632
quadrifilis, *Polynemus*, 180
quadriguttata, *Diacope*, 44
quadriguttatus, *Mesoprion*, 44
quadrilineata, *Arelia*, 435
quadrilineata, *Plagusia*, 435
quadrilineatus, Cynoglossus, 432, 435
quadrilineatus, *Holocentrus*, 70
quadrilineatus, *Pelates*, 70
quadrilineatus (*Pelates*) Therapon, 70
quadrilineatus, Therapon, 70, 72
quadripinnis, Salarias, 331
quadripunctatus, *Scomber*, 252
quadripunctatus, Trachinotus, 233
quagga, Synaptura, 430
qualar-katchelee, *Labrus*, 183
qu-ce, 114
quinqueaculeata, *Raja*, 743
quinquelineata, *Paramia*, 66
quinquefasciatus, *Erychthys*, 396
quinquefasciatus, *Scarus*, 396
quinquelineatus, Cynoglossus, 432
quinquelineatus, *Holocentrus*, 40
quinquelineatus, Lutianus, 40, 41
quinquelineatus, *Lutjanus*, 46
quinquelineatus, *Pelates*, 70
quinquelinearis, Lutianus, 34, 46
quinquelinearis, *Holocentrus*, 46
quinquelinearus, Lutianus, 41
quinquelineatus, Cheilodipterus, 66
quinquelineatus, *Mesoprion*, 40, 41
quinque-maculatus, *Hemipteronotus*, 402

quinque-strigatus, Gobiodon, 297
quinque-strigatus, *Gobius*, 297, 298
quinquevittatus, Apogon, 65, 386, 746
quinquevittatus, Grammistes, 46
quinquevittatus, *Holocentrus*, 46
quinquevittatus, *Scarus*, 405
quoi, *Scarus*, 412
quoyanus, Serranus, 13

raan-kaal-le, 584
rabaji, *Holocentrus*, 141
Rabdophorus, 103
rabdophorus, Holacanthus, 114
rab-na-dah, 19
Racoma, 531
Raconda, 623, 646
radiata, Pterois, 154
radiatus, Serranus, 21
radiolatus, Barilius, 589, 590
radjabou, *Holocentrus*, 82
Regalecus, 376
rahtee-bontoo, *Perca*, 23
rahtee-goolivinda, 126
rahtee yellakah, 689
rahti, Glyphidodon, 746
rahti, Glyphisodon, 386
rahti jellah, 495
rahti potah, *Chætodon*, 386
raii, *Monoceros*, 209
Raitaborua, 666
raitaborua, *Anguilla*, 666
raitaborua, Moringua, 666
raitaborua, *Muræna*, 666
rajah-mas, 550, 594
RAJIDÆ, 727, 735
rallia, 415
Rama, 451
ramah-parah, 225
rama-karé, 240
ramak, Lethrinus, 137
ramak, *Sciœna*, 137
rama, Leiocassis, 451
rama moolean, 685
raman sorrah, 715
rama, *Pimelodus*, 451, 492
ramcarati, *Apterygia*, 646
ramcarati, Coilia, 630, 631
ramcarati, *Mystax*, 631
ramosus, Cheilio, 407
ran-doh-nee, 128
ranga, Ambassis, 51, 242, 746
ranga, *Chanda*, 51
rangoo, 38
rangoo, *Sparus*, 37
rangus, *Lutjanus*, 47
rangus, Mesoprion, 38, 39
ran sorrah, 715
rapax, *Osteobrama*, 586, 587
Rasbora, 583, 594, 604
rasbora, *Cyprinus*, 584
rasbora, *Leuciscus*, 584
rasbora, *Leuciscus*, 584
rasi, Acanthurus, 205
ra sorrah, 726
ra-ta-charm-dah, 743
rati-papirai, 341
rattoo girawah, 408
ravulensis, *Crossocheilus*, 548
rayneri, Galeocerdo, 710, 718
Rays and skates, Sub-order of, 709, 727
rays transformed to spines, 139
reani, Scomber, 250
reba, Cirrhina, 541, 547, 549
reba, *Crossocheilus*, 549
reba, *Cyprinus*, 549
rectangulus, Balistes, 687, 691
rectangulus, *Balistrapus*, 691
recurverostris, *Perilampus*, 583
Red-fish and mode of preparation, 629
Red-rice, 629
reevesii, Callionymus, 322
reetah, 608
reichei, *Halichœres*, 400
reichei, *Julis*, 400
Reniceps, 719
Remilegia, 257
remora, Echeneis, 258
remoroides, Echeneis, 258
Remoropsis, 257
rerio, *Barilius*, 597
rerio, *Cyprinus*, 597
rerio, Danio, 595, 597
rerio, *Nuria*, 597
resimus, *Chætodon*, 113
respiration of fishes, x, 439
respiratory air-sac, 439
reticularis, *Gymnothorax*, 669
reticularis, Muræna, 667, 669
reticularis, *Murænophis*, 669
reticularis, Tetrodon, 699, 700, 705, 706
reticulata, Muræna, 669
reticulata, Muræna, 669
reticulata, *Thyrodontis*, 670
reticulatus, Balistes, 690
reticulatus, Chætodon, 108
reticulatus, Glyptosternum, 496, 498
reticulatus, *Gymnothorax*, 669
reticulatus, *Perilampus*, 596
reticulatus, Thalassophryne, 269
rewah, 549
rewah, Cirrhina, 549
reynaldi, Coilia, 630
reynaldi, Hemiramphus, 513, 514, 515
reynaldi, Platax, 236
reynauldi, Labeo, 537
reynauldi, *Rohita*, 536
rhabdophorus, Sisor, 491
Rhachinotus, 736
Rhamphistoma, 509
Rhamphobatis, 730
Rhina, 730
Rhinesomus, 695
rhinobate, *Raie*, 731
RHINOBATIDÆ, 727, 730
Rhinobatus, 730, 731
rhinobatus, Rhinobatus, 732
Rhinogobius, 282
Rhinoptera, 742, 743
rhinorhynchus, Engraulis, 626
Rhinoscion, 184
rhodopterus, Lethrinus, 137
rhodopterus, Triacanthus, 685
rhodopterygius, *Bagrus*, 445
rhombeus, *Centrogaster*, 235
rhombeus, *Centropodus*, 235
rhombeus, *Monodactylus*, 235
rhombeus, *Psettus*, 235
rhombeus, *Scomber*, 235
Rhombochirus, 257
rhomboides, *Acanthinion*, 234
rhomboides, *Chætodon*, 234
rhomboides, Trachinotus, 234
Rhomboidichthys, 425
Rhombotides, 202
Rhombus, 246
Rhomboplites, 29
Rhynchichthys, 170
Rhynchobatus, 730
Rhynchobdella, 338
RHYNCHOBDELLIDÆ, x, 338
Rhynchote, 699
Rhynchotus, 699
rictuosus, Apocryptes, 300
Rice pounder, 691
richardi, Hemiramphus, 514
richardsonii, *Cyprinus*, 530
richardsonii, Oreinus, 529, 530
richianus, Schizothorax, 531
ricnorhynchus, *Gobio*, 540
ricnorhynchus, Labeo, 540
ricnorhynchus, *Lobocheilos*, 540
risua, Polynemus, 176
Rita, 440, 454
rita, *Arius*, 454
rita, *Pimelodus*, 454
ritoides, *Arius*, 454, 455
ritoides, Rita, 454
rivers, diverted, xi
rivers having Alpine sources, ix
rivers of India, ix
rivers poisoned, x
rivulata, *Diacope*, 37
rivulata, *Genyoroge*, 37
rivulatoides, *Scarus*, 413
rivulatus, Balistes, 690
rivulatus, Cheilinus, 394
rivulatus, Dentex, 90
rivulatus, *Gymnocranius*, 90
rivulatus, Lutianus, 37
rivulatus, *Lutjanus*, 37
rivulatus, Pseudoscarus, 411, 413
rivulatus, Salarias, 331
rivulatus, *Scarus*, 413
rodactylus, Barbus, 561
rodericensis, Platycephalus, 275
Rogenia, 634
Rohita, 534, 545
rohita, *Cyprinus*, 538
rohita, Labeo, 535, 538
Rohtee, xv, 586, 605
Rohitichthys, 534
roop-chanda, 116
rosea, *Scorpæna*, 151
rosea, Scorpænopsis, 151, 152
roseipinnis, Apogon, 61
roseipinnis, Barbus, 557, 562
rosenbergii, *Gnathypops*, 267
rosenbergii, Opisthognathus, 267
roseus, *Amblyopus*, 319
roseus, Cocotropus, 160
roseus, Lutianus, 38
rosmarus, *Holocentrus*, 15
rossii, Glyphisodon, 387
rostellatus, *Rohita*, 545
rostrata, Albula, 649
rostrata, Botia, 606
rostratus, *Chætodon*, 110
rostratus, Chelmo, 110
rostratus, *Chelmon*, 110
rostratus, *Crossocheilus*, 548
rostratus, Lethrinus, 134
rostratus, *Ophisurus*, 662, 664
ro-thul-dah, 222
rotleri, Caranx, 213
rottleri, Caranx, 213
rottleri, *Scomber*, 213
rottleri, *Megalaspis*, 213
rouxii, *Cirrhinus*, 538
rouxii, Labeo, 538
rouxii, *Rohita*, 538
rowjedah, 19
rubellus, *Mesoprion*, 32, 33, 39
ruber, *Gobioides*, 320
ruber, Holocentrus, 172
ruber, *Johnius*, 196
ruber, Mulloides, 122
ruber, Otolithus, 196
rubicunda, *Amblyopus*, 319
rubicunda, *Synanceia*, 161
rubicunda, *Trigla*, 160
rubicundus, Gobioides, 319
rubicundus, *Odontamblyopus*, 319
rubidipinnis, *Cobitis*, 614
rubidipinnis, Nemacheilus, 612, 614
rubiginosus, *Canthophrys*, 610
rubra, *Perca*, 25
rubra, *Sciœna*, 172
rubricatus, Therapon, 70
rubripes, *Leuciscus*, 590, 591
rubripinnis, Cirrhina, 547
rubripinnis, *Cobitis*, 610
rubro-punctatus, *Cirrhinus*, 539
rubrostigma, Aplocheilus, 522
rubrostigma, Haplochilus, 522
rubrostigma, *Panchax*, 522
rubrotinctus, *Systomus*, 575
rubrum, Holocentrum, 172, 173
ruchu, 536
ruconius, Ambassis, 242
ruconius, *Chanda*, 97, 242, 746
ruconius, Equula, 239
ruconius, Equula, 242
ruce, 538
rufa, Novacula, 402
ruficaudus, Salarias, 330
rufus, Discognathus, 528
rugosus, Barilius, 592
ruhu, 538
rupicola, Nemacheilus, 613, 616
rupicola, *Schistura*, 616
rupecula, *Cobitis*, 616
rupeculus, *Gonorhynchus*, 527
Rupiscartes, 263, 328, 329
rupelliæ, *Dalophis*, 669
rupelli, *Cobitis*, 612
ruppellii, Acanthurus, 207
rupelli, *Nemacheilus*, 612
ruppelli, Nemachilichthys, 612
ruppellii, *Dilobomycterus*, 702
ruppellii, *Julis*, 408
ruppellii, Muræna, 667, 669
ruppellii, *Olistus*, 223
ruppellii, *Scarus*, 411
rüppellii, *Scolopsides*, 87
ruppellii, Seriola, 227
Russell, Dr., ii
russelliana, Raconda, 646
russellianus, *Pristigaster*, 647
russellii, *Amphacanthus*, 166
russellii, *Apistes*, 159
russellii, Barbus, 560, 561
russellii, Caranx, 214
russellii, Engraulis, 629
russellii, Gobius, 292
russellii, *Gymnetrus*, 376
russelli, Hemiramphus, 514
russellii, *Leiurus*, 687
russellii, *Lutjanus*, 42
russellii, *Mesoprion*, 41
russellii, *Parupeneus*, 126
russellii, Pellona, 645
russellii, *Platessa*, 423
russellii, Pseudorhombus, 423
russellii, Pseudoscarus, 413
Russellii, Pterois, 152
russellii, Regalecus, 376
russellii, *Scarus*, 413
russellii, *Sciœna*, 183
russellii, *Solea*, 428
russellii, *Squalus*, 712
russellii, *Stolephorus*, 629
russellii, *Synaptura*, 428
russellii, *Trachinotus*, 233
russellii, Trachynotus, 233
russellii, Triacanthus, 685
russellii, Trygon, 737
russellii, Umbrina, 183

russellii, Upeneus, 126
russellii, Wallagoo, 480
russellii, *Xiphicthis*, 376
russellii, *Xiphichthys*, 337
rutta, 302

saal candee, 563, 573
saant-al, 616
sable fish, 640
Saccobranchus, x, 439, 441
saccogularis, *Apterigia*, 656
sada, *Crossocheilus*, 548
sada, *Cyprinus*, 548
sada kholisha, 375
Sadanundio, Gobius, 296
safgha, *Perca*, 52
sofgha, *Sciæna*, 52, 53
sagitta, Callionymus, 321, 322, 323
sagor, Arius, 457, 461
sagor, *Bagrus*, 461
sagor, *Pimelodus*, 461
sahinga, 606
sah-lun, 495
sahnee moia, *Labrus*, 399, 413
sahni-tschapi, *Chætodon*, 113
Salarias, 328
saliens, *Blennius*, 330
salmoides, *Leuciscus*, 594
salliah, Polynemus, 180
salmoides, *Holocentrus*, 20
salmoides, Serranus, 20
salmoneus, *Leuciscus*, 651
salmoneus, Chanos, 651
salmoneus, *Mugil*, 651
SALMONIDÆ, 508
salmonoides, Serranus, 12, 20
Salmophasia, 599
salt earth, xvi
salt, cost of, xvi
salt tax, xvi, 238
Samaragius, 282
sambra, *Alphestes*, 37
sambra, *Lutjanus*, 38
sambra, *Mesoprion*, 38
sammara, Holocentrum, 173
sammara, *Perca*, 173
sammara, *Sciæna*, 173
sampitensis, *Corvina*, 185
sancti-petri, Chorinemus, 230, 231
sancti-petri, *Scomberoides*, 230
sancur, *Raja*, 740
sandkhol, *Leuciscus*, 554
sandkhol, Thynnichthys, 554
sang-go-ah, 444
sangiensis, *Amia*, 64
sangiensis, Apogon, 64
sanguinea, *Diacope*, 32
sanguineus, *Mesoprion*, 32
sanguinolenta, Synanceia, 162
sans tache, Tetrodon, 703
sansun, *Carangus*, 216
sansun, Caranx, 216
sansun, *Scomber*, 216
sappa sorrah, 719
sapé kattclee, 189
sappatee, 429
saraly, 252
sarana, 560
sarana, Barbus, 557, 560, 561
sarana, Barbus, 559, 561
sarana, *Cyprinus*, 560
sarana, *Puntius*, 560
sarba, Chrysophrys, 142
sarba, *Sparus*, 142
sardina, Aspidoparia, 585
Sardine, 648
Sardinella, 634
sardinella, Chela, 600
sardinella, *Leuciscus*, 600
SARGINI, 133
Sargus, 133
sari-kullah, *Perca*, 190
Sarothodus, 103
sathete, Muræna, 667, 668
sathete, *Murænophis*, 668
sativa, Oryza, 629
sathete, *Thyrsoidea*, 668
Satura, 685
satyrus, *Trichopodus*, 372
saul, 529
saulinga pam, 673
Saurenchelys, 658, 663
saurida, 503, 504
Sauridichthys, 505
Saurus, 503
Saurus à bandes et taches, 505
saurus, Elops, 649
Sauvage, Dr., vii
savayensis, Apogon, 60, 101
savala, *Euchelyopus*, 201
savala, Trichiurus, 201
savon-khorka, 619
savona, *Cobitis*, 619
savona, Nemacheilus, 613, 619
Saw fishes, 728
sawl, 363
saxatilis, *Chætodon*, 386
saxatilis, Glyphisodon, 386
sawala, 201
sawaryi, 200
say-meen, 568
scaber, *Arothron*, 704
scaber, *Cottus*, 275
scaber, Platycephalus, 275
scaber, Tetraodon, 704
scandens, Anabas, 370
scandens, *Lutjanus*, 370
scandens, *Perca*, 370
scandens, *Sparus*, 370
scansor, *Amphiprion*, 370
Scaphiodon, xiii, xiv, 550, 604
scapularis, *Julis*, 400
scapularis, Platyglossus, 398, 400
Scarichthys, 391, 409
Scaroidei, 390
Scartelaos, 304
Scatophagus, 114
scaturigina, *Cobitis*, 614
schihpan, Serranus, 19
schilbeichthys, 470
Schismatorhynchus, 534
schismatorhynchus, Belone, 510
schismatorhynchus, *Mastacembelus*, 510
Schistorus, 8, 9
Schistura, 606
Schizopyge, 529, 531
Schizopygopsis, 531, 604
SCHIZOTHORACINÆ, xiv, 529, 534
Schizothorax, 529
Schizothorax, 531, 604
Schlegel, Professor, vii
schlegeli, Apogon, 59
schlegeli, Chrysophrys, 375
schegelii, Arius, 463
schlegelii, *Bagrus*, 445
schlegelii, Chrysophrys, 140
schlegelii, Pellona, 643
schlosseri, *Gobius*, 304
schlosseri, *Periophthalmodon*, 304
schlosseri, Periophthalmus, 303, 304
schlosseri, *Scarus*, 117
schmittii, Balistes, 689
Schneider, ii
schonleinii, Platyrhina, 735
schotaf, *Sciæna*, 81
schultzei, Murænichthys, 663
sceleratus, Tetrodon, 700, 701
Sciades, 456
Sciæna, 181, 193
Sciæna, 184
SCIÆNIDÆ, 181, 457
Sciænoidei, 5, 144, 377
Sciænoides, 193
Sciænops, 184
scintillans, Eleotris, 314
SCLERODERMI, 684
Sclerogenidæ, 147
Scoliodon, 710, 711
Scolopsides, 78, 84
Scolopsis, 84
Scomber, 250
Scomberoidei, 210, 338
Scomberoides, 229
SCOMBRESOCIDÆ, 438, 509
SCOMBRIDÆ, 250
scombrina, *Alosa*, 634, 636
scombrina, Clupea, 636
Scombrisidæ, 210
Scopas, 202
Scorpæna, 149
Scorpæni, 274
scorpænoides, *Centropistes*, 747
scorpænoides, Myriodon, 747
Scorpænichthys, 150
SCORPÆNIDÆ, 147
Scorpænidæ, 274
Scorpænopsis, 149
Scorpænopsis, 150
Scorpeni, 148
Scorpidina, 102
scorpion goby, 286
SCOPELIDÆ, 438, 503
Scopelus, 503, 506
scriptus, *Aluteres*, 694
scriptus, *Balistes*, 694
scriptus, Monacanthus, 692, 694
scutata, Amphisile, 361
scutatus, *Centriscus*, 361
sculptus, Boleophthalmus, 308
SCYLLIIDÆ, 709, 724
Scylliorhinus, 724
Scyllium, 724
Scyphius, 680
Scytalophis, 664
Scyris, 210, 211
sea fisheries, xvi, xvii
sea fish, marked from Nepal, 81
Sea frogs, 699
seba, Diagramma, 79
sebæ, Amphiprion, 377, 378
sebæ, *Diacope*, 31
sebæ, *Genyoroge*, 31
sebæ, Lutianus, 30
sebæ, *Lutjanus*, 31
sebæ, *Mesoprion*, 31
sebæ, Serranus, 14
sebanus, Chætodon, 106
seba, *Plectorhynchus*, 79
Sebastes, 148, 747
Sebastichthys, 148
Sebastodes, 148
Securicula, 599
securifer, Stromateus, 247
seela-panni, 13
seengala, 444
seenghala, *Bagrus*, 444
seenghala, Macrones, 442, 444
seenghala, *Platystomus*, 444
seengtee, *Pimelodus*, 447
seer, 179
seer-fishes, 254
see-tul, 654
seheli, Mugil, 347, 355
SELACHOIDEI, 709
selanghat, Chatoessus, 633, 634
Selar, 210, 211
Selaroides, 210, 211
Selene, 115
sele, Polynemus, 179
sel-konah, 602
sel-len, 593
selli patte, 426
sem, Caranx, 216
semiarmatus, Nemacheilus, 613, 616
semicæruleus, Julis, 404
semicinctus, Premnas, 380
semicirculatus, Holacanthus, 112
semidoliatus, Gobius, 295
semifasciatus, Blennius, 326
semifasciatus, Cynoglossus, 432, 436
semifasciatus, Julis, 403
semiluctuosa, *Corvina*, 191
semiluctuosa, *Johnius*, 191
semiluctuosa, Sciæna, 191
seminuda, Albula, 649
Semiplotus, xv, 549, 604
semiplotus, *Cyprinus*, 550
semipunctatus, *Julis*, 408
semipunctatus, Serranus, 20
semisagittatus, Pristis, 728
semistriatus, Tetraodon, 706
semivelatus, *Chrondrostoma*, 543
semizonata, *Cobitis*, 614
semizonata, Nemacheilus, 614
sem-pooram, 173
sem-sorrah, 712
sen-ga-lee, 367
sen-nee, 560
senticosus, Balistes, 688
sentoree, 550
sephen, *Hypolophus*, 740
sephen, *Raja*, 740
sephen, Trygon, 737, 740
septemfasciata, *Perca*, 20
septemfasciata, Glyphidodon, 385, 386
septem-radiatus, *Gobius*, 304
septem-radiatus, Periophthalmus, 304
septi, 129
sericus, *Engraulis*, 649
Seriola, 226
Seriola, 227
Seriolichthys, 228
serpentarius, *Nemacheilus*, 526
serpentinus, Ophiocephalus, 365
serperaster, Apocryptes, 300
serradentata, Murænesox, 662
Serranichthys, 8, 9
SERRANINA, 8
serrata, Fistularia, 360
serraticornis, *Balistes*, 693
serrato-spinosus, Callionymus, 322
serratus, Arius, 457, 462
serratus, *Cannorhynchus*, 360
serratus, *Johnius*, 187
serratus, Platycephalus, 277
serratus, Syngnathus, 677
serratus, *Trachyrhamphus*, 677
servus, *Holocentrus*, 69
servus, Therapon, 69, 482
Seserinus, 246
sesquilineatus, Balistes, 691
setifer, *Chanda*, 97, 98
setifer, Chætodon, 106
setifer, Gerres, 97, 747
setifer, Monacanthus, 692
setifer, *Scolopsides*, 98

setifer, Xiphasia, 337
setifer, *Xiphogadus*, 337
setigera, Equula, 243
Setipinna, 624
setipinnis, Megalops, 650
setirostris, *Clupea*, 626
setirostris, Engraulis, 624, 626, 627
setirostris, *Stolephorus*, 627
setirostris, *Thryssa*, 627
setosus, Gobius, 287, 291
sewerzowi, Diptychus, 534
sexdecim-lamellata, Echeneis, 258
sex-fasciatus, Caranx, 216
sexfasciatus, *Epinephelus*, 17
sexfasciatus, Gobius, 285
sexfasciatus, *Halichœres*, 396
sexfasciatus, Hemigymnus, 396
sexfasciatus, *Labrus*, 386
sexfasciatus, Serranus, 17
sexfasciatus, Serranus, 17
sexfasciata, *Tautoga*, 396
sex-filis, Polynemus, 177, 178
sexfilis, *Trichidion*, 178
sexguttata, Eleotris, 311
sexguttata, *Eleotriodes*, 311
sexguttata, *Valenciennea*, 311
sex-lineatus, *Bodianus*, 28
sex-lineatus, *Pelates*, 70
sexlineatus, Therapon, 70
sex-maculata, Novacula, 402
sextarius, Polynemus, 177, 178
seweyah, 203
Shacra, 588
shacra, Barilius, 589, 590
shacra, *Cyprinus*, 590
shagra, *Barbus*, 590
Sharks, how captured, 718
Sharks, Sub-order of, 709
sheen-ee, 487
shee-nharo, 606
shellee, 563
shemen tenkee, 739
shemhara, 42
shengna-roet, 116
shoay-zagay, 607
sholang kellete, 446
shuk, 116
shun-gun, 145
Siaja, 556
siamensis, *Catopra*, 131
siamensis, *Diacope*, 31
sibbaldii, Diagramma, 80
Sicogaster, 298
Sicydiini, 281, 298
Sicydiops, 298
Sicydium, xiii, 298
Sicyopterus, 298
sidat, *Muræna*, 660
Sidera, 667
siderea, Muræna, 672
sigana, Teuthis, 165
Siganus, 165
siggapu cullawah, 25
signatus, Balistes, 690
signatus, Polyacanthus, 371
signifer, Monacanthus, 693
sihama, *Atherina*, 265
sihama, Sillago, 265
sihamus, *Platycephalus*, 265
Sillaginidæ, 264
Sillaginodes, 264
Sillaginopsis, 264
Sillago, 264
sillaoo, Lutianus, 38, 39
sillaoo, *Mesoprion*, 40
sillaoo, *Sparus*, 39
silond, 488
silondia, *Pimelodus*, 488
Silundia, 441, 487
Silurichthys, 475
SILURIDÆ, xiv, xv, 438
Silurodes, 475
siluroides, *Ompok*, 476
siluroides, *Phalacronotus*, 477
Siluroids, xv, 524
Silurus, xiii, xiv, 441, 480
silver pomfret, 247
simmena, Pristipoma, 72
simulans, Tetrodon, 707
simulans, *Arothron*, 707
sina, *Corvina*, 189
sina, *Corvina*, 186
sina, *Johnius*, 186
sina, Sciæna, 186, 188
sindensis, Callichrous, 476
sindensis *Cirrhina*, 544
sindensis, Clupea, 635, 638
sindensis, Cynoglossus, 432, 434
sindensis, *Glyphidodon*, 385, 388, 748
sindensis, Labeo, 535, 544
sindensis, Pomacentrus, 748
sinensis, Bostrichthys, 309
sinensis, Bostrychus, 309
sinensis, Clupea, 641
sinensis, *Eleotris*, 309
sinensis, *Gobius*, 309
sinensis, *Philypnus*, 309
sinensis, Stromateus, 246
singapurensis, Murænesox, 662
singharee, 444
singi, 487
singio, Saccobranchus, 486
singio, *Silurus*, iv. 486
sin-go-rah, 448
sinuatus, Nemacheilus, 612, 615
sinuatus, Oreinus, 529
sinuatus, *Schizothorax*, 529
sinuosus, Cheilinus, 394
sin-toumbi, 153
sinuata, Umbrina, 182
sinura, *Clupea*, 653
sipili, 114
sipu-tarate, 116
sirm, Clupea, 636
Sisor, 441, 491
Skates and Rays, Sub-order of, 709, 727
Sladen, Col. vi
sladeni, Pellona, 643, 645
sladoni, Chela, 599, 600
Smaris, 94
Smiliogaster, 586, 588
soaresi, Eleotris, 313
sobaco, Balistes, 688
soborna, Corica, 642
sohorna, *Pellona*, 642
soh-lee, 185
soh-ru, 138
sol, 366
sola, 366
solandri, Tetrodon, 707
soldado, *Corvina*, 185
Solea, 421, 425
Solegnathus, 681
SOLENOSTOMIDÆ, 676
Solenostomus, 676
solenostomus, 360
solio, *Cyprinus*, 599
Somdrum-kara-moddee, 174
somdrum yellakah, 687
Somileptes, 605, 608
somnolentus, Lobotes, 84
sona, Arius, 457, 462
sona kah tiriki, 737
sona-ka-wahlah, 201
sona, *Pimelodus*, 462
sondah, 50
sondaicus, *Bagrus*, 461
sonneratii, *Holocentrus*, 380
sonneratii, Opisthognathus, 266
sonnerati, Serranus, 9, 25
soomorah, 583
soon-da-lee, 614
soonnee, 549
soor, 186
soosta, 32
sophore, Barbus, 557, 566
sophore, Barbus, 579
sophore, *Cyprinus*, 566, 579
sophore, *Puntius*, 582
sophore, *Systomus*, 566, 579
sophoroides, Barbus, 571
sora-parah, 213
sordidum, Diagramma, 81
sordidus, *Arothron*, 704
sordidus, *Chætodon*, 385
sordidus, Glyphidodon, 385
sordidus, *Pomacanthus*, 385
sordidus, Pseudoscarus, 411, 413
sordidus, *Scarus*, 413
sordidus, Tetraodon, 704
soring, *Sparus*, 265
sorrah, Carcharias, 711, 714
sorrah, *Isoplagiodon*, 714
sorra kowah, 713
souleyetii, Julis, 405
souwah, 186
sowarah, 366
sowarah, Ophiocephalus, 364
spadiceus, Tetrodon, 701
spa-ta-rah, 340
spallanzanii, *Leptocephalus*, 658
spallanzanii, *Oxyrhina*, 722
SPARIDÆ, 132
spatula, *Cottus*, 276
spatula, Platycephalus, 276
species how arranged, 7
species, number in work, ii
spectabilis, Gobius, 295
spectabilis, *Prostheacanthus*, 608
speciosus, Caranx, 226
speciosus, *Gnathanodon*, 226
speciosus, *Scomber*, 226
speigleri, Mugil, 346, 348
Sphærodon, 138
Sphagebranchus, 663
Sphagomorus, 421
Sphyræna, 342
sphyræna, *Argentina*, 649
sphyræna, *Esox*, 342
SPHYRÆNIDÆ, 342
Sphyrna, 719
spicifer, Syngnathus, 677, 678
spilonopterus, Exocœtus, 519
spilopholis, Barbus, 559
spilopholus, Barbus, 559, 560
spilopterus, *Cobitis*, 620
spilopterus, Nemacheilus, 613, 620
spilotes, Cossyphus, 392
spilurus, Barbus, 561
spilurus, Serranus, 25
spilurus, Upeneus, 126
spined eels, 338
spines and rays of fins, how differ in number, 370
spinifer, Holocentrum, 172
spinifer, Pagrus, 138
spinifer, *Sparus*, 138
spiniferum, Holocentrum, 173
spinosa, *Lichia*, 234
spinosissimum, Holocentrum, 173
spinosissimus, Diodon, 708
spinosus, Anabas, 370
spinosus, Danio, 595
spinosus, *Deliodon*, 234
spinosus, Platycephalus, 276
spinosus, Scopelus, 507
spinosus, Trachinotus, 234
spinulosus, Barbus, 557, 567
spinus, *Sparus*, 165
spiral fold in intestines, 652
Spirobranchidæ, 369
splendens, Equula, 239
splendens, Exocœtus, 519
splendens, *Leiognathus*, 240
Spondyliosoma, 90
spontaneous salt, xvi
Spratella, 634
Spratelloides, 623, 648
squalidus, Therapon, 70
SQUAMIPINNES, 102
Squamipinnes, 132, 210
squamipinnis, Mugil, 349
Squirrel-parrot, 405
stamineus, Gobius, 292
Stegostoma, 724, 725
steindachneri, Blennius, 325, 326
stellans, Serranus, 746
stellaris, Balistes, 687
stellata, Halieutea, 273
stellata, Teuthis, 168
stellatus, *Amphacanthus*, 168
stellatus, *Arothron*, 705
stellatus, *Astrocanthus*, 273
stellatus, Balistes, 686, 687
stellatus, *Crayracion*, 705
stellatus, *Leiurus*, 687
stellatus, *Lophius*, 273
stellatus, *Scarus*, 168
stellatus, Tetrodon, 699, 700, 705
stellatus, Tetrodon, 706
Stellifer, 184
stelligera, *Cephaloptera*, 745
Stenogobius, 282
stenorhynchus, *Gonorhynchus*, 528
Stephanolepis, 692
Stethojulis, 390, 396
stethophthalmus, Gobius, 284
stevensonii, Barbus, 558, 569
stewartii, Ophiocephalus, 363, 367
sthenocephalus, Osteogeniosus, 469
stigma, Barbus, 559, 566, 579
stigma, *Leuciscus*, 579
stigmapomus, Serranus, 26
Stigmatogobius, 282
Stoasodon, 743
Stolephorus, 624
stoliczkæ, *Cobitis*, 620
stoliczkæ, Danio, 597
Stoliczka, Dr. Ferdinand, vi
stoliczkæ, Exostoma, 501, 502
stoliczkæ, Glyptosternum, 499
stoliczkæ, Gobius, 292
stoliczkæ, Labeo, 535, 537
stoliczkæ, Nemacheilus, 613, 620
stoliczkæ, Schizopygopsis, 531
stoliczkæ, *Sebastes*, ii, 747
stoliczkæ, Serranus, 11
stoliczkanus, Barbus, 559, 577
stoliczkanus, Cyprinodon, 521
Stomias, 658
Strachey, General, v
stracheyi, Barbus, 557, 566
streams, damming of, xi
striata, Cepola, 324
striata, *Coryphæna*, 90
striato-maculatus, Salarias, 333

striatum, Glyptosternum, 496, 498
striatus, Balistes, 691
striatus, Cæsio, 95
striatus, *Dentex*, 90, 91
striatus, Epibulus, 394, 395
striatus, *Gobius*, 283, 292
striatus, *Gobius*, 307
striatus, *Euctenogobius*, 292
striatus, Holacanthus, 112
striatus, Nemacheilus, 613, 617
striatus, Ophiocephalus, 363, 366
striatus, *Perilampus*, 597
striatus, *Pneumobranchus*, 656
striatus, Synagris, 90, 91
stridens, *Perca*, 72
stridens, Pristipoma, 72
stridens, *Sciæna*, 72
striga, Hemiramphus, 516
strigata, Amphisile, 361
strigilifer, Triacanthus, 685
strigiventer, *Halichœres*, 397
strigiventer, *Julis*, 397
strigiventer, Stethojulis, 397
strigosus, Acanthurus, 207
striolata, Teuthis, 166
striolatus, Labeo, 586
striolatus, Salarias, 329, 333
striolatus, *Tylognathus*, 542
Stromateidæ, 246
Stromateinæ, 246
Stromateoides, 246
Stromateus, 246
stromateus, *Apolectus*, 247
strongia, *Scorpæna*, 148
strongensis, *Sebastes*, 148
strongia, Sebastichthys, 148
strongylurus, Belone, 509, 512
strongylurus, *Mastacembelus*, 512
Strophidon, 667
subarmatus, Acanthurus, 204
subarmatus, Balistes, 688
subbaokoa, Syngnathus, 677
subcarinata, *Zonichthys*, 226
subfusca, *Schistura*, 617
subfuscus, *Cobitis*, 617
subfuscus, Nemachilus, 617
sublitus, *Cephalogobius*, 289
sublitus, Gobius, 289
sublitus, *Glossogobius*, 289
submaculatus, *Johnius*, 196
subnasutus, Barbus, 561
subrostratus, Arius, 457, 461
subspinosa, Thryssa, 625
subviridis Mugil, 347, 353
subviridis, Mugil, 352
subvittatus, *Mullus*, 120
sucatio, *Cyprinus*, 526
sucatio, *Psilorhynchus*, 526
sudoal, 490
sudi-sandawah, Stromateus, 247
sudumu, 245
suffada-muddawa, 142
sufflamen, Balistes, 687
suggalathoo-bontoo, Perca, 18
suillus, Serranus, 12, 19
sukkun, 191
sukujellah, 448
sulcatus, *Glyptosternum*, 500
sulcatus, Pseudecheneis, 500
sullaneroo-kuntee, *Sparus*, 170
sulphureus, *Leuciscus*, 579
sulphureus, Upeneoides, 120
sulphureus, *Upeneus*, 120
sumatranus, Arius, 457, 460
sumatranus, *Bagrus*, 460
sumatranus, *Rhombus*, 425
sumbawensis, Pseudoscarus, 413
summana, *Bodianus*, 21
summana, *Epinephelus*, 21
summana, *Perca*, 21
summana, *Perca*, 22
summana, *Pomacentrus*, 21
summana, Serranus, 21
summana, Serranus, 16
sundaica, Clupea, 638
sundaicus, *Brachirus*, 429
sundanensis, Mugil, 352
sundaree, 550
sungarah, 45
sund-u-a-rie, 593
suppositus, Mugil, 348
suratensis, *Chætodon*, 415
suratensis, Etroplus, 414, 415, 416
surinamensis, *Holocentrus*, 84
surinamensis, Lobotes, 84
surmuletus, *Mullus*, 120
susuki, Plectropoma, 20
sutiha, *Cyprinus*, 583
sutor, *Amphâcanthus*, 167
sutor, Teuthis, 167
suttiwarah, 732
sword-fishes, 198
Sykes, Col. W. H., iv
sykesii, *Gagrius*, 455
sykesii, Pseudeutropius, 471, 473
sykesii, *Schilbe*, 473
sykesii, Silundia, 487
Symbranchidæ, 655
Symbranchina, 655, 656
Symbranchus, 655, 657
Synagris, 89
Synagris, 90
Synanceia, 162
Synanceia, 163
Synanceichthys, 162
Synancidium, 162
Synaptura, 421, 428
Synchiropus, 321
Syncrossus, 606
Synechogobius, 282
Synistius, 96
Syngnathidæ, 676
Syngnathina, 676, 677
Syngnathoides, 681
Syngnathus, 676, 677
Synodus, 503, 504
Syrrhina, 731
Systomus, 556

taakree, *Bagrus*, 471
taakree, *Eutropius*, 471
taakree, *Hypophthalmus*, 471
taakree, Pseudeutropius, 471
taan-tah, 190
tabaccaria, Fistularia, 360
ta-but-ti, 371
tacheté, Chætodon, 106
tænia, *Amblyopus*, 319
tænia, Cobitis, 609
tænianotus, *Apistus*, 157
tænianotus, Amblyapistus, 157
tænianotus, *Platypterus*, 157
tænianotus, *Tetraroge*, 157, 160
tæniata, *Amia*, 62
tæniata, *Perca*, 144
tæniatus, Apogon, 59, 101
tæniatus, Polynemus, 179
Tænioidei, 324, 376
Tænioides, 316
Tæniophis, 667
tæniops, *Mesoprion*, 38
tæniops, Pomacentrus, 383
tæniopterus, Upeneoides, 122
tæniopterus, Hippocampus, 682
tæniopterus, *Upeneus*, 122
Tæniura, 736, 740
tæniurus, Dules, 67
tæniurus, *Moronopsis*, 37
tæniurus, *Paradules*, 67
tahiticum, Holocentrum, 173
tahlun-kala, 179
tah-meer-dah, 166
tahmel, Pimelopterus, 143
tala bon, 661
tala, Chorinemus, 231, 232
tala-parah, *Scomber*, 231
talam-parah, *Scomber*, 221
talla-maya, 555
tambra, 553
tambulus, *Dentex*, 92
ta-meen, 568
tampara, 628
tampa, Chatoessus, 633
tanga-parah, 223
tankervillæ, *Gerranus*, 144
tanks, stocking with fish, 553
tapeinosoma, *Lepidozygus*, 384
tapeinosoma, Pomacentrus, 384
tappu cooti, 741
tartoore, 646
tartoore, *Pristigaster*, 646
tartoor, Opisthopterus, 646
tarui, 350
taru-kattelee, 183
tasmanius, Platycephalus, 277
tassart, *Cailleu*, 634
tatnam-karé, 240
taty, Engraulis, 624, 628
taty, *Stolephorus*, 628
Taurichthys, 110
Tautoga, 395
tauvina, *Holocentrus*, 13
tauvina, *Perca*, 12, 13
tauvina, Serranus, 13
tauvinus, Serranus, 12
tawoaloo-pinnel, 78
tay-lee, 553
tchawil-parah, 223
tchirri, 542
teekanee, Chela, 602
teekanee, *Leuciscus*, 602
teekanee, *Perilampus*, 602
teira, *Chætodon*, 235, 236
teira, Platax, 235
telabon, *Conger*, 661
telabon, Murænesox, 661, 662
telabonoides, *Conger*, 662
telabonoides, Murænesox, 661, 662
telamparah, *Carangoides*, 222
Telara, 624
telara, *Clupea*, 627
telara, Engraulis, 624, 627
telaroides, Engraulis, 628
telchitta, Glyptosternum, 496, 498
telchitta, *Pimelodus*, 498
Teleostei, 1
tella-katchelee, *Labrus*, 185
tellarree, 548
tella-sandawah, Stromateus, 247
tella-soring, 265
telliah, 498
tembang, Clupea, 638
temeree, 733
temminckii, Carcharias, 711, 717
temminckii, *Lamiopsis*, 717
te-nevere, 122
tengana, *Batasio*, 493
tengana, Gagata, 492, 493
tengana, *Macrones*, 493
tengana, *Pimeladus*, 492, 493
tengara, *Bagrus*, 447
tengara, *Bagrus*, 451
tengara, Macrones, 443, 447
tengara, Macrones, 448
tengara, *Pimeladus*, 447
teng-ga-ra, 444
tengra, 448
tenkee kunsul, 741
tenkee shindraki, 738
tennentii, Acanthurus, 204
tentacularis, Gobius, 291
tentacularis, *Oxyurichthys*, 291
tenuicauda, *Cobitis*, 620
tenuicauda, Nemachilus, 620
tenuifilis, Engraulis, 628
tenuirostris, Belone, 511
tenuis, Boleophthalmus, 305
tenuis, Goboides, 319
tenuis, *Micraphis*, 678
tenuispinis, Amblyceps, 490, 491
tenuispinis, Arius, 456, 458, 466
tepa, Tetrodon, 701
teraia, Trachinotus, 234
tergaree-parah, 227
teria, Polynemus, 180
terio, Barbus, 559, 580
terio, *Cyprinus*, 580
terio, *Systomus*, 580
teri pungti, 580
terla, *Chætodon*, 116
Terpolepis, 659
tessellata, Muræna, 667, 670
tessellata, *Thyrsoidea*, 670
tessellatus, *Gymnothorax*, 670
tesserula, Ostracion, 696
testudinarius, *Arothron*, 705
testudineus, *Amphiprion*, 370
testudineus, Anabas, 370
testudineus, *Anthias*, 370
testudineus, *Crayracion*, 705
testudineus, *Sparus*, 370
testudineus, Tetrodon, 705
testudo, *Lutjanus*, 370
Tetrabranchus, 657
tetracanthe, *Perca*, 172
tetracanthus, *Catopra*, 130
tetradactylus, *Eleutheronema*, 180
tetradactylus, Polynemus, 180
Tetradrachmum, 377, 380
tetragonus, Ostracion, 696
Tetraodon, 699, 700
Tetrapturus, 198
Tetraroge, 159
tetrarupugus, Barbus, 556, 558, 572
tetrarupugus, *Systomus*, 572
tetraspilus, Barbus, 573
tetrazona, Cheilinus, 394
Tetrodon, 698, 699
Tetrodontina, 698
Tetrosomus, 695
tetragonus, *Syngnathus*, 681
Teuthis, 165
Teuthididæ, 165
Teuthyes, 165
textilis, Salarias, 334
teysmanni, Clarias, 484
Thærodontis, 667
thalassina, *Netuma*, 463
thalassinus, Arius, 457, 463
thalassinus, *Bagrus*, 463
thor-oar-dah, 165, 167
thay-lee, 487
theliya, 338
thendala, 143
theophrasti, Ophiocephalus, 363
theraps, Therapon, 70
Therapon, 68
Theraponidæ, 5, 144

THERAPONINA, 68
therapon, *Mesoprion*, 47
theraps (*Datnia*) Therapon, 70
thermalis, Ambassis, 746
thermalis, Apogon, 64
thermalis, Barbus, 559, 580
thermalis, Barbus, 571
thermalis, *Cobitis*, 610
thermalis, Lepidocephalichthys, 609, 610
thermalis, *Leuciscus*, 580
thermoicos, *Esomus*, 583
thermoicos, Nuria, 583
thermophilos, Nuria, 583
thermophilus, *Perilampus*, 583
thetti, 116
theuthis, Acanthurus, 206
Tholichthys, 102
tholo-dah, 265
Thomas, Henry Sullivan, Esq., vi
thomassi, Ambassis, 52
thomassi, Barbus, 557, 567
thomassi, Scaphiodon, 551
thook-o-doo-noo-dah, 512
thoracata, *Kowala*, 635
thouin, *Raie*, 732
thouiniana, *Raja*, 732
thouini, Rhinobatus, 731, 732
thrissa, *Clupea*, 634
Thryssa, 624
thunnina, Thynnus, 252
thuri, 338
Thynnichthys, xv, 554, 604
Thynnus, 251
Thysoidea, 667
thyrsoidea, Muræna, 667, 672
tica. *Diacope*, 43
tictis, *Cyprinus*, 572
Tickell, Col., v
ticto, Barbus, 556, 559, 576, 577
ticto, *Cyprinus*, 576
ticto, *Rohtee*, 576
ticto, *Systomus*, 576
tigre, *Squale*, 725
tigrina, Gymnomuræna, 674
tigrina, *Murænoblenna*, 674
tigrinum, Stegostoma, 725
tigrinus, *Ichthyophis*, 674
tigrinus, Galeocerdo, 718
tigrinus, *Squalus*, 725
tik giraurah, 408
tila, *Cyprinus*, 590
tila, *Leuciscus*, 590
tilei, 593
tile, *Gymnothorax*, 668
tile, Muræna, 667, 668
tile, *Murænophis*, 668
tile, *Thyrsoidea*, 668
tileo, Barilius, 589, 593
tileo, *Cyprinus*, 593
tileo, *Leuciscus*, 593
Tilurus, 658
tipi ulavi, 731
tit punyti, 572
timlei, Narcine, 733
timlei, *Raja*, 733
timoriensis, Therapon, 69
Tinca, 594
ting-ga-rah, 447
tin-til, 142
titius, *Cyprinus*, 572
titius, Barbus, 572
titius, *Systomus*, 572
tjutjot, Carcharias, 716
toal-parah, 231
to-bro-dah, 180
todah, 7
to-go-re-dah, 38
tol, Chorinemus, 230, 231
toli, *Alausa*, 641
toli, *Alosa*, 641
toli, Clupea, 635, 641
tollam-parrah, 222
tolo, Chanos, 651
toloo, Chorinemus, 232, 233
toloo-parah, *Scomber*, 232
tol-parah, *Scomber*, 230, 231
tolu, *Dentex*, 91
tolu, Synagris, 91
tombel, *Laurida*, 504
tombil, Saurida, 504
tonkah-talawaree, *Ophidium*, 337
took, 599, 601, 602
tool-danti, 264
tooroo-kattelee, 191
topasui, Polynemus, 176
tor, Barbus, 557, 564, 565
tor, *Cyprinus*, 564
tor, *Labeobarbus*, 565
TORPENIDÆ, 727, 733
torquatus, *Scolopsides*, 87
torquatus, Scolopsis, 87, 88
torquatus, *Xirichthys*, 409
torriti, 116
torvus, Caranx, 218
torvus, *Selar*, 218
tottah-karah, *Zeus*, 238
tourah, 338
Toxotes, 116
TOXOTINA, 102
trachacanthus, *Bagrus*, 446
Trachicephalus, 163
Trachidermis, 747
TRACHINIDÆ, 262
trachipomus, Arius, 462
trachipomus, *Bagrus*, 462
Trachurus, 210
Trachurops, 210
trachynis, *Synanecia*, 162
Trachynotus, 232
trachypareia, Xiphasia, 337
TRACHYPTERIDÆ, 376
Trachyrhamphus, 677
tragula, *Mullus*, 121
tragula, Upeneoides, 121
tragula, *Upeneus*, 121
transiens, Salarias, 332
Transitional species, 556
transversus, Therapon, 70
tredecem-radiatus, Periophthalmus, 304
tredecem-radiatus, *Gobius*, 304
Trees, Fish climbing, 369
TRIACANTHINA, 684
Triacanthus, 684
triacanthus, *Nauclerus*, 229
triacanthus, *Perca*, 28
Triænodon, 710, 720
Triænophorichthyini, 281
triangularis, Balistes, 689
triangularis, Nemacheilus, 613, 619
triangularis, *Pachynathus*, 689
Trichidion, 176
TRICHIURIDÆ, 200
Trichiurinæ, 200
Trichiurus, xvi, 200
trichoderma, *Arothron*, 704
trichoderma, Tetraodon, 704
trichodermatoides, *Arothron*, 704
trichodermatoides, Tetraodon, 704
Trichogaster, x, 373
Trichopsis, 371
Trichopus, 371
Trichosoma, 630
Trichosomus, 156
tricolor, Amphiprion, 378
tricolor, Gomphosus, 406
tricuspidata, Murænesox, 662
tricuspidatus, Carcharias, 711, 713, 722
tricuspidatus, *Congrus*, 662
tricuspidatus, Hemiramphus, 515
tridactylus, *Blennius*, 330
tridactylus, Salarias, 329, 330, 331
tridentifer, Hemiramphus, 516
Tridentiger, 298
tri, Engraulis, 625, 630
trifasciatus, Chætodon, 107
trifasciatus, *Lutjanus*, 380
trifasciatus, Premnas, 380
trifasciatus, *Trachypterus*, 473
trifasciatus, Upeneus, 124
trifoliatus, Anabas, 370
TRIGLIDÆ, 148
Triglidæ, 274
Triglini, 274
Trigloidei, 279
trigloides, Tripterygium, 336
trilineatum, Glyptosternum, 496, 497, 499
trilineatus, *Glyptothorax*, 497
trilineatus, Pomacentrus, 382
trilobatus, Cheilinus, 393, 394
trilobatus, Julis, 405
trilobatus, *Labrus*, 404
trilobatus, *Labrus*, 394
trimaculatus, Apogon, 62
trimaculatus, Hippocampus, 682
trimaculatus, Julis, 404
trimaculatus, Pomacentrus, 382
triocellatus, *Pleuronectes*, 424
triocellatus, Pseudorhombus, 423, 424
triocellattus, *Rhombus*, 424
Triodon, 698
TRIODONTINA, 698
triostegus, Acanthurus, 204
triostegus, *Chætodon*, 204
triostegus, *Rhombotides*, 204
Tripterygium, 336
tripunctatus, Pomacentrus, 383
tripunctatus, *Systomus*, 576
trispinosus, Batrachus, 269
tri, *Stolephorus*, 630
tristis, Muræna, 671
tristis, *Systomus*, 573
Triurus, 505
trivittatus, *Coius*, 67, 70
trivittatus, *Pterapon*, 69
trivittatus, Therapon, 69
trompa, *Lija*, 694
Tropidichthys, 699
Tropodinius, 29
troschellii, Mugil, 348, 358
troschelli, Pseudoscarus, 413
troschelli, *Scarus*, 413
Trout, introduction of to India, 508
Trulla, 431
truncata, *Laurida*, 504
truncata, *Setipinna*, 627
truncatus, Saurus, 504
Trygon, 736
TRYGONIDÆ, 727, 736
Trypauchen, 319
Trypauchini, 282
tsikideandoo, 295
tuberculatum, Chiloscyllium, 726
tuberculatus, Ostracion, 696
tuberculatus, Platycephalus, 275
tuberculatus, Rhinobatus, 732
tuberculatus, *Squalus*, 726
tuberculatus, *Synchismus*, 726
tuber, Naseus, 208
tuberosus, Naseus, 208
tuberosus, Naso, 208
tudes, *Cestrocion*, 720
tudes, *Sphyrna*, 720
tudes, Zygæna, 719
tulu candal, 651
tumbil, *Salmo*, 504
tumbil, Saurida, 504, 505
tumbil, *Saurus*, 504
tumbil, *Osmerus*, 504
tumidus, *Chironectes*, 272
tumifrons, Eleotris, 310
tumilabris, Serranus, 16, 21
tunicatus, Amphiprion, 379
tunny fish, 251
tupasi, 177
tuppa koollee, 742
tupsee-mutchee, 176
turah, 340
turi, 340, 621
tur-goorch, 685
turio, *Cobitis*, 621
turio, Nemacheilus, 621
turritus, Ostracion, 695
turritus, *Tetrosomus*, 695
Turtle's stomach, 379
Turtle's tail, 678
Tylognathus, 534
Tylosurus, 509
typle, Syngnathus, 677
typus, *Carangichthys*, 223
typus, Gagata, 492
typus, Gagata, air-vessel of, 466
typus, Ketengus, 468
typus, *Pinjalo*, 94
typus, Rhinobatus, 732
tyrwhitti, *Chætodon*, 386
tyrwhitti, Glyphisodon, 386

uarnacoides, Trygon, 737
uarnak, *Pastinachus*, 737
uarnak, *Raja*, 737
uarnak, Trygon, 737
ulietensis, Chætodon, 104
ullahti, 649
ulavi, 731
ulu parti, 274
Umbrina, 181
umbrostygma, Julis, 404
undala, 354
undec collee, 370
undosquamis, Saurida, 505
undosquamis, *Saurus*, 504
undulatus, Balistes, 687, 691
undulatus, *Macrognathus*, 340
undulata, Muræna, 667, 671
undulata, *Murænophis*, 671
undulatus, Trygon, 737
undulosus, *Bodianus*, 13
undulosus, *Epinephelus*, 13
undulosus, Serranus, 13
Unibranchapertura, 657
unicolor, *Balistes*, 693
unicolor, *Colisa*, 375
unicolor, Mastacembelus, 339
unicolor, *Merous*, 26
unicolor, Plotosus, 482
unicolor, Premnas, 380
unicolor, Salarias, 329, 334
unicolor, *Trichogaster*, 375
unicornis, *Acanthurus*, 209
unicornis, *Aspisurus*, 209
unicornis, *Chætodon*, 209
unicornis, Naseus, 209
unifasciatus, Chætodon, 107
unifasciatus, Hemiramphus, 513, 514
unimaculatus, Barbus, 559, 581
unimaculatus, Chætodon, 107

unimaculatus, Glyphisodon, 387
unimaculatus, *Lutjanus*, 42
unimaculatus, *Mesoprion*, 41, 43
unimaculatus, *Systomus*, 581
unispina, *Somileptes*, 614
unitus, Salarias, 332
untrahi, 601
untrahi, Chela, 600, 601
Upeneoides, 119
Upeneus, 119
Upeneus, 123
Uranichthys, 664
uranoscopa, *Synanceia*, 164
URANOSCOPIDÆ, 260
Uranoscopus, 260
uranoscopus, Polycaulis, 164
Uraspis, 210, 211
Uroconger, 658, 661
Urogymnus, 736
uronemus, Polynemus, 179
Uropterygius, 674
urophthalmus, Nemacheilus, 614
urostigma, Julis, 403
urotænia, Ambassis, 55
ursi, 643
urua, *Bagrus*, 473
urua, *Pimelodus*, 473

vaadhul, 129
vacha, 490
vacha, *Bagrus*, 490
vacha, Eutropiichthys, 490
vacha, *Pimelodus*, 490
vachelli, Ambassis, 54
vachelli, Balistes, 687
vacti, *Caius*, 7
vagabundus, Chætodon, 105
vagabundus, Chætodon, 105
vagans, Thynnus, 252
vagina, *Gobius*, 320
vagina, Trypauchen, 320
vagra, Barilius, 588, 589
vagra, *Cyprinus*, 589
vagra, *Leuciscus*, 589
vagus, Ophiocephalus, 366
vahm, 340
Vaillant, M. vii
valenciennei, *Johnius*, 189
valenciennesi, Engraulis, 626
Valenciennesia, 309
valenciennesi, *Stolephorus*, 626
valenciennesii, *Tylognathus*, 540
valenciennii, Muræna, 671
valentini, Ostracion, 697
vamos, *Muræna*, 666
Valliaul-cutchul, 174
vanicolensis, Pempheris, 175
variabilis, Petroscirtes, 326, 327
vari, Caranx, 218
Varicorhinus, 556
variegata, Anguilla, 659
variegata, Cepola, 324
variegata, Clupea, 635, 639
variegata, *Echidna*, 673
variegata, Muræna, 672, 673
variegata, *Pœcilophis*, 673
variegatus, Callionymus, 322
variegatus, Psilorhynchus, 527
variegatus, Trygon, 737
variegatus, Upeneoides, 121
vari-katchelee, 190
variletta, 252
Variola, 8
Variola, 26
variolosus, Serranus, 15
vari, *Selar*, 218
varius, Monacanthus, 693
varius. Gomphosus, 406
varri korawa, 690
velangoo, 658
velatus, Labeo, 536
velifer, Acanthurus, 207, 208
velifer, *Xiphias*, 198
velifer, *Zabrasoma*, 207
vella-arwoolee, 246
vellachee candee, 599, 601
vella-chembolay, 42
vella-kadisay, 45
vella kalada, 489
vella kelletee, 447
vella-kattelee, 185, 188
vellamattawa, 142
vellaoodoo, 233
vella sorrah, 729
vellavoval, 247
ven-beyti, 194
ven-candee, 537, 547
venenatus, Gobius, 286
venenosa, *Alosa*, 638
venenosa, Clupea, 638
venenosa, *Meletta*, 638
venosa, *Scorpæna*, 151
venosa, Scorpænopsis, 151, 152
venosus, *Cephalocassis*, 460
venosus, *Aluterius*, 694
venosus, Arius, 457, 460
ventralis, Gobius, 294
verarl, 366
verarlu, 366
verdatre, *Baliste*, 689
veri-cut-ta-lay, 31
veri-keechan, 33
veri-karé, 239
variolosus, *Holocanthus*, 705
vermiculata, Muræna, 668
vermiculata, Teuthis, 166
vermiculatus, *Amphacanthus*, 166
vermiculatus, Exocœtus, 519
vermiculatus, Salarias, 330, 333
vermiformis, *Chilorhinus*, 663
vermiformis, Murænichthys, 663
vermiformis, *Ophisurus*, 664
vermin, xi
verri-cullawah, 23
verrucosa, Synanceia, 162
verrucosus, Balistes, 688, 690
verrucosus, *Balistrapus*, 691
versicolor, Otolithus, 197
vertical band, sign of immaturity, 518
vespertilio, Chætodon, 236
vespertilio, Platax, 236
vespertilio, Platax, 236
vetula, Balistes, 686, 688
vet-ool-pathy, 275
vigorsii, *Abramis*, 587
vigorsii, Rohtee, 586, 587
vigorsii, *Systomus*, 587
virescens, Anguilla, 660
virescens, Chætodon, 106
virescens, *Gallus*, 224
virgata, Coryphæna, 248
virgata, *Datnia*, 70
virgata, Teuthis, 166
virgatus, *Amphacanthus*, 166
virgatus, *Arothron*, 704
virgatus, Tetrodon, 704
virgatus, Therapon, 70
viridescens, Balistes, 686, 689
viridescens, Calliodon, 410
viridescens, Nangra, 494
viridescens, *Pimelodus*, 494
viridipunctatus, Gobius, 286, 747
viridipunctatus, *Leiodon*, 707
viridipunctatus, Tetrodon, 700, 707
viridis, Balistes, 691
viridis, Boleophthalmus, 30
viridis, Cheilio, 407
viridis, Eleotris, 312
viridis, *Gobius*, 307
viridis, Gomphosus, 406
viridis, *Labrus*, 403
viridis, Pseudoscarus, 412
viridis, *Scartelaos*, 307
vitta, *Diacope*, 46
vitta, Lutianus, 46
vitta, *Lutjanus*, 46
vitta, *Mesoprion*, 46
vittargentea, *Clupea*, 629
vitta, *Serranus*, 46
vittata, *Cobitis*, 620
vittata, Echeneis, 257
vittata, *Sciæna*, 28
vittatus, Acanthurus, 20
vittatus, Aplocheilus, 523
vittatus, Barbus, 559, 582
vittatus, Callichrus, 479
vittatus, *Canthophrys*, 609
vittatus, Chætodon, 107, 747
vittatus, *Chironectes*, 272
vittatus, *Esomus*, 583
vittatus, *Hypeneus*, 120
vittatus, Macrones, 443, 448
vittatus, *Mullus*, 120
vittatus, Platycephalus, 275
vittatus, Plotosus, 483
vittatus, *Puntius*, 582
vittatus, Upeneoides, 120, 121
vittatus, *Upeneus*, 120
vittatus, *Silurus*, 448
vittiger, Apogon, 58
viviparus, Plotosus, 482
vlamingii, Upeneus, 135
vogleri, *Otolithus*, 186
vogleri, *Pseudosciæna*, 186
vogleri, Sciæna, 186
vogleri, Sciæna, 188
volans, Exocœtus, 519
volans, Pegasus, 280
volitans, *Gasterosteus*, 152, 153, 154
volitans, Exocœtus, 519
volitans, *Pseudomonopterus*, 154
volitans, Pterois, 153, 154
volitans, *Sorpæna*, 154
volugiri tenkee, 740
vomer, *Zeus*, 224
vosmaeri, Scolopsis, 87
vosmari, *Anthias*, 87
vosmeri, *Anthias*, 87
vosmeri, *Lutjanus*, 87
vosmeri, *Scolopsides*, 87
vosmeri, Scolopsis, 87, 88
vulgaris, *Colisa*, 374
vulgaris, Mustelus, 720
vulgaris, Tinca, 508, 594

waageni, Barbus, 559, 581
waandersi, *Epinephelus*, 12
waandersi, Serranus, 12
waandersi, Serranus, 746
wahlah, 480, 652
wahlah kuddera, 510
waigiensis, Glyphisodon, 386
waigiensis, Mugil, 348, 359
waigiensis, Myriodon, 747
waigiensis, Pimelepterus, 143
waigiensis, *Scorpæna*, 747
waigiensis, Upeneus, 126
walawah tenkee, 731
walbeehmii, Carcharias, 711, 712, 717
walga, Trygon, 736, 737, 738
Wallago, 441, 479
wallago, 479
wallago, *Silurus*, 480
wal-la-ke kel-le-tee, 487
wallah tattah, 653
wanah mottah, 505
wan-jou, 487, 488
warri-parah, 219
wartee-polah, 295
wassinki, *Amia*, 61
wassinki, Apogon, 61
watamoo kola, 694
Watson, H. E., Esq., vi
watsoni, Scaphiodon, 551
wattanah, *Chondrostoma*, 548
weirs, ix, 640
westphali, *Tæniophis*, 672
whitebait, 629
white mullet, 651
white pomfret, 246
whiting, 194
willughbeii, Balistes, 688
wingeram, *Scomber*, 254
wodawahah, *Zeus*, 98
wodlah-muku, 512
wolfii, *Corvina*, 185
wolga tenkee, 740
Wood-Mason, J., Esq., vi
woolaree, Rasbora, 584
woongooni, 95
woora, *Corythobatus*, 59
woragoo, *Scomber*, 213
worm-parrot, 396
worah, 165
worahwah, 165
wori-parah, *Scomber*, 225
worrah-minoo, *Trigla*, 155, 159
wotim-parrah, *Scomber*, 216
wooro, Minous, 159
wounds from ray, 738
wounds caused by siluroids, 439
wounds from saccobranchus, 487
wrahl, 366
wrahl, Ophiocephalus, 365, 366
Wright, Dr., vi
wulluven sorrah, 718
wumboo, 555
wunnuttee, 371
wutla-collawah, 18
Wyllie, Dr., iv
wynaadensis, Barbus, 558, 568
wynaadensis, Silurus, 480

xanthocephalus, Chætodon, 104
xanthochir, Pseudochromis, 267
xanthognathus, Monopterus, 656
xanthognatha, *Ophicardia*, 656
xanthogramme, *Leuciscus*, 584
xanthometopon, Holacanthus, 114
xanthoptera, *Ilisha*, 643
xanthoptera, Pellona, 643
xanthopterus, Acanthurus, 205
xanthopterus, Gymnomuræna, 674, 675
xanthopterus, Hemiramphus, 513, 514
xanthopterus, *Uropterygius*, 674
xanthopterygius, *Mesoprion*, 35
xanthopus, *Diacope*, 44
xanthopygus, Caranx, 215
xanthotænia, Lethrinus, 137
xanthozona, *Dascyllus*, 381
xanthozona, *Tetradrachmum*, 381
xanthurus, Acanthurus, 207
xanthurus, Amphiprion, 379
xanthurus, Caranx, 218, 219
xanthurus, Holacanthus, 113
xanthurus, *Prochilus*, 379
xanthurus, Therapon, 70
xanthonemus, Polynemus, 177, 178

Xenodon, 686
Xenomystus, 653
Xenopterus, 698, 699
Xiphasia, 336, 337
XIPHIIDÆ, 198
Xiphogadus, 336, 337
xirichthoides, *Novacula*, 409
Xyrichthys, 401, 408

ya-paw-nga, 598
yapilli, Lutianus, 45
yapilli, *Sparus*, 45
yarra-soring, 264
yarrellii, Bagarius, 495
yarrellii, *Bagrus*, 495
yarrellii, *Pimelodus*, 495
yellaka, Balistes, 687
yemungolah, 199
yen-boung-za, 585

Zabrasoma, 202
zanana, *Epinephelus*, 25
Zanclurus, 198
Zanclus, 111
zanzibarensis, Rasbora, 584
zanzibarensis, Syngnathus, 678
zebra, Acanthurus, 204
zebra, *Brachyurus*, 153
zebra, *Chætodon*, 204
zebra, *Diacantha*, 606
zebra, *Echidna*, 673
zebra, *Gymnomuræna*, 673
zebra, *Gymnothorax*, 673
zebra, Muræna, 668, 673
zebra, *Pleuronectes*, 430
zebra, *Pseudomonopterus*, 153
zebra, Pterois, 153
zebra, Synaptura, 428, 430
zebrinus, Mastacembelus, 389
zeylanicus, *Labrus*, 403
zeylonicus, Apogon, 64
zeylonicus, *Amphiprionichthys*, 158
zeylonicus, *Leuciscus*, 651
zeylonicus, Micropus, 158
zeylonicus, Mulloides, 122
zeylonicus, *Upeneus*, 122, 123
Zenarchopterus, 512
zenephorus, *Labrus*, 396
zonalternans, *Cobitis*, 618
zonalternans, Gobius, 289
zonalternans, Nemacheilus, 613, 618
zonata, *Cobitis*, 618
zonata, Nemacheilus, 613, 618
zonata, *Schistura*, 618
zonatus, Glyphisodon, 387
Zonogobius, 282
zoo-roo-cart-dah, 629
zugei, Trygon, 737, 738
Zygæna, 710, 719
zygæna, *Cestracion*, 720
zygæna, *Sphyrna*, 720
zygæna, *Squalus*, 719, 720
ZYGÆNINA, 710, 719
Zygonectes, 521
zysron, Pristis, 728, 729

THE END.

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